
# DISTANCE EDUCATION FOR TEACHER TRAINING:

## Modes, Models, and Methods


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## About the Author

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# Foreword

It's 1939, and Margaret Fitzsimons, a 17-year-old girl in rural County Cavan, Ireland, practices the glyphs and strokes of Pitman shorthand by candlelight. Though she dreams of working in an office, Margaret's school offers only cooking and sewing classes. Margaret has managed to enroll in a course in Pitman shorthand through a London-based correspondence school. After several months of self-study, Margaret will sit the exam that assesses her mastery of Pitman shorthand, and her results will be sent to London for marking. Hundreds of miles away in Ireland, Margaret will wait for the results that will determine whether she attains or falls short of her professional dream.

The above scene is time-bound, indeed almost anachronistic. Decades later, studying alone by candlelight—even in the most rural and isolated parts of Ireland, a formerly impoverished nation—is a quaint memory of times past.

Today, even learners in the remotest areas of the island can tap into high-speed Internet portals and access online learning opportunities. Across the globe, learners like Margaret no longer need to study in isolation, or learn exclusively from a book, or wait months for exam results. Instead, they can interact with a variety of media, collaborate with peers as needed via online networks, and receive almost instantaneous assessment results.

But the above scene is also timeless. In parts of the globe where hundreds of millions of people lack electricity, or where electrical infrastructure has been destroyed by conflict or natural disasters, distance learners like Margaret still sit by candlelight or by a fire, studying from a book or guide. Content may now come via one's mobile phone versus the post, but these distance learners still study and struggle alone. Like Margaret, they sit their exams and wait—perhaps months—for results that determine whether their educational dreams will be realized or deferred.

Thanks to advances in technology, communications, our knowledge of teaching and learning, and most recently to the COVID-19 pandemic "emergency remote learning," the field of distance education has changed dramatically since 1939. Yet its essence has remained constant. Distance learning has always been about offering learning opportunities to communities that have historically been excluded from formal learning systems—women, religious and cultural minorities, refugees, people with special needs, or inhabitants of remote geographic regions. It has always been about leveraging a combination of available technologies—copy machines, the post, trucks, ships, radio, telephone, computers, or fiber-optic cables—to overcome the challenge of a global pandemic, geography, conflict, terrain, or shortages of local human capacity—in order to provide knowledge and opportunities to those who want and need them. It has always been about bringing to bear innovation—either technological or educational—to offer new methods and modes of education, so that students can learn in ways that may be more useful than those offered in a traditional "brick-and-mortar" or "clay-and-wattle" school setting. It has always been about expanding limited learning opportunities and offering the convenience of learning to those who cannot—because of their age, gender, physical condition, occupation, or family responsibilities—take advantage of traditional schooling or who must move away in order to do so. And at its very foundation, distance education has always been about helping individuals fulfill their professional dreams and aspirations—whether to be an office worker or a teacher.


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Figure 1: Correspondence Course Diploma, Margaret Fitzsimons

Margaret passed her examination in Pitman shorthand (see Figure 1) and went on to work in an office—first in the Cavan County Courthouse and then, upon emigration to the United States, as a secretary in the Massachusetts State House. It is the author's hope that this guide will provide new knowledge, ideas, and insights to those who fund, design, oversee, and teach in distance education programs for learners like my mother, Margaret Fitzsimons Burns.

## About This Guide

This publication is a second edition of the 2011 guide by the same name. It discusses distance education modes, technology-based models, and the many methods used for distance-based teacher pre-service education, in-service teacher professional development, and ongoing teacher support. It focuses on how technology delivers learning to teachers and its direct and indirect benefits to teachers and teaching

The information in this guide is based on three primary sources. The first is an extensive review of the research on distance learning, technology, and professional development from across the globe including "gray literature"—distance program reports and internal documents. The second is the long history of Education Development Center (EDC) in the field of distance-based education internationally—particularly in the areas of interactive audio instruction (IAI), television-based learning, and online learning. The third is the author's almost three decades of professional experience designing, evaluating, and teaching online and blended courses for teachers, coaches, and teacher educators. This information is leavened by input and experiences of many of the professionals mentioned in the "Acknowledgements" section. Thus the guide blends research, field-based programmatic data, and professional expertise for a comprehensive portrait of the intricacies of distance education.

Distance education, or distance learning, has long been a major form of professional development for pre-service and in-service teachers in developing and developed countries (see Figure 2 for the working definition of *teacher professional development* used throughout this guide). It is so well documented that the reader may wonder why we would embark upon another publication about distance education for teacher professional development. But this guide differs in several ways from a good deal of the existing literature on distance education.

**Figure 2**
**What is Teacher Professional Development?**

The Organisation for Economic Co-operation and Development (OECD) defines teacher professional development as "a body of systematic activities to prepare teachers for their job, including initial training, induction courses, in-service training, and continuous professional formation within school settings" (Organisation for Economic Co-operation and Development, 2009, p. 19).

Increasingly, the term "teacher professional learning," denoting the active nature of learning, has come to replace "teacher professional development." Both terms will be used in this guide.

First, this guide examines all *modes* of distance education, from traditional print-based distance education to mobile learning. In so doing, it concentrates on the most salient design issues as they affect the quality of *teaching and learning* in distance education courses. The often-overlooked bottom line in distance education is not the policy framework or the technology mode, as important as they are—it is the *quality* of teaching and learning. Thus, in addition to descriptions of the *modes* of distance education, this guide focuses on *models* of what has worked and, in Section II, on *methods*—the design, instruction, assessment, and supports—that directly shape the quality of learning opportunities in distance education courses, as well as on documented best practices that result in high-quality distance learning for pre- and in-service teachers.

Next, this guide examines in depth both established and emerging technologies, not only to help readers understand the characteristics of various technologies as they relate to distance learning for teachers but also to ground readers in their benefits and limitations as modes of instruction to support teacher learning.
We advance the argument that the same benefits that make many of these technologies powerful tools for *student* learning also make them

potentially significant tools for *teacher* learning—*even if they have never previously been used this way.* The potential of these student-facing tools as relevant modes and models of teacher learning is a consistent theme throughout this guide.

**Figure 3**
**"Knowledge" and "Skills" Defined**

Every distance education program aims in one way or another to improve teachers' knowledge and skills. But what exactly are "knowledge" and "skills"?

*Knowledge* is a broad and diffuse term. Often, when we speak of teachers' knowledge, we are referring to multiple domains—their mastery of the content they teach, their knowledge of how students learn, their ability to identify appropriate assessment or instructional models, and their "pedagogical content knowledge"—knowledge of appropriate teaching materials, technology, media, and strategies to help students master the difficult areas of a domain (Shulman, 1986). This body of knowledge is sometimes referred to as "propositional knowledge."

*Skills* include knowing how to implement propositional knowledge. Skills involve *processes, procedures,* and *strategies* that help teachers *perform* certain tasks. For instance, knowing how to teach difficult content in a way that makes it accessible to learners is a skill. Solving a problem is a skill. Knowing how to facilitate a meaningful discussion among students is a skill. Skills may be considered "procedural knowledge."

Teachers must possess both *propositional* and *procedural* knowledge. But learning the skills of effective teaching requires continuing guidance and modeling, myriad opportunities for practice, and structured feedback and reflection as part of a continuous improvement cycle.

Third, the education and technology fields, like many professions, are flooded with terms that are ill defined but so commonly used that they become jargon, serving as a source of confusion rather than consensus. For that reason, this guide takes particular care to clearly define as many terms as possible, most notably in the numerous textboxes and the glossary at the end of this guide (Appendix 2). It is our belief that by proposing a common or shared technical language around commonly used terms (e.g., "interactive" or "learner-centered"), we can begin to develop clarity and consensus around terminologies and taxonomies, which in turn may result in more standardized and uniformly designed and applied inputs, use cases, and practices.

Finally, the guide takes a broader view of technology for "teacher training." Technology can be used as (1) a direct vehicle for teacher preparation and ongoing professional development (for example, via online courses); (2) a vehicle for open, self-paced informal learning (as in the case of multimedia); (3) a support tool for teachers (via coaching or mentoring); or (4) a secondary or indirect vehicle for teacher learning—for example, teachers learning from technology and media directed toward and used by students, such as instructional television. All of these uses of technology will be explored in this guide.

Any guide about distance education would be remiss if it did not address the impact of the COVID-19 pandemic school lockdowns of 2020–2021 and ensuing emergency "remote learning." These events catapulted distance learning onto a global stage, exposing its many fault lines—the lack of equity in terms of learner access to technology; the highly didactic and passive design endemic to so much distance learning; the lack of technology access and preparation for teachers; and the impoverished learning experience that resulted from hastily-planned distance courses devoid of meaningful interactions with peers and with an instructor. While it is unfair to compare well-planned distance learning with the chaos of emergency remote teaching, the latter, for all its travails, did manage to introduce a vastly larger pool of the world's teachers and students to the convenience, power, scale, and learning potential of distance education.

As remote learning elucidated and this guide elaborates, distance education is an ecosystem with its own bodies of knowledge, pedagogies, and processes, all of which shape and are shaped by the particular technologies with which they interact. All must be carefully designed, managed, supported, assessed, and measured. In doing so, we can learn from the many limitations of emergency distance education and transition to a more defined, carefully designed, equitable, and deliberative form of distance education that offers a quality education to all learners, not simply to the most privileged (Burns, 2020).

## Organization

This guide discusses how various distance education technologies—both traditional and emerging—can support the actual teaching and learning process. The guide is organized in two main sections. Section I focuses primarily on modes and models, while Section II concentrates on methods. These terms are defined as follows:

- *Modes* refers to the larger distance-based delivery system—Web-based, audio-based, or print-based distance education.
- *Models* refers to the specific representations, uses, and ways in which these modes are implemented for teacher education. For example, interactive audio instruction is one *model* of a mode of audio-based instruction; radio lessons are another. *Models* focus not simply on larger categories of technologies but on their use. One university's program using mixed reality to help pre-service teachers practice classroom management techniques is a *model*. One state education agency's use of virtual classes to burnish unqualified the content skills of teachers as they instruct students is a model. One country's national online learning program is a model (See Appendix 1 for a complete list of the 188 countries and territories mentioned in this guide).
- *Methods* refers to best practices, typically informed by research and evidence that promote excellence in distance education—instructional design, preparing distance instructors, securing high-quality content, or assuring quality.

## Audience

While the audience for this guide is ostensibly anyone interested in distance learning, it has several intended audiences: (1) readers who design, deliver, and manage *in-person* teacher professional development generally and who are exploring how distance technologies might support and extend such work; (2) readers who do the above within the bilateral and multilateral education development world in Low- and Middle-Income Countries (LMICs) as funders, implementers, evaluators, or researchers; and (3) readers who operate within adult-based distant learning programs for pre-service and in-service teachers, such as universities, school districts, Ministries of Education, teacher training institutions, education organizations, and nonprofits, in any region of the globe.

## Caveats

As with any document of this size and scope whose focus is the dynamic and ephemeral topic of technology, a number of caveats must be stated up front. First, technology is characterized by multivalence—technologies such as *virtual worlds, online learning*, or *immersive environments* often mean different things to different people. The increasing convergence of technologies (applications and devices) and the protean nature of the Internet often render attempts at differentiation and categorization within distance education "families" difficult. For example, should digital learning games be classified as Internet-based, multimedia-based, or mobile forms of distance learning? Is multimedia just another way to refer to Internet content? Is interactive audio instruction really a distance technology when both teachers and students are in the same classroom? In an Internet-dominated world, are distance education categorizations still relevant?

Within this guide, decisions to place one or another technology under the rubric of a certain mode of distance education are driven principally by the technology's core functions. Nonetheless, such classifications may appear subjective, and readers may find themselves in disagreement with these taxonomical decisions. Such objections highlight the converging, fluid, and dynamic nature of technology.

Next, this guide contains examples of past and present distance education programs and projects. As much as possible, we have tried to select models supported by available and accessible rigorous evidence as well as best practice, but this is not always possible. As will be seen in many cases where research on teachers' experiences is thin, in an effort to provide information to inquiring readers we are forced to turn to adult learners and university students as proxies for existing and pre-service teachers. In the world of educational technology, publication bias abounds; thus, there is often more information on what works versus what doesn't.

Finally, technology is incredibly dynamic and constantly evolving—technology products are developed, hyped, bought, sold, and discontinued. Some technologies will prove to be transformational, others will be a bust. Research, too, is constantly evolving. Further, the lifespans of both international development projects and World Wide Web sites can be evanescent. Technology products and educational projects can end abruptly, leaving website cadavers as the only evidence of their existence. Thus, given this mutability, we therefore apologize but assume no responsibility for technologies unaddressed in this guide, changing research, projects that are no longer operative or websites that are no longer functional.

Distance education for teacher professional development is ultimately about improving the quality of teaching so that we can improve student learning. But in this regard, distance learning is not enough. The school system in which new teachers begin their career, and to which in-service teachers return from professional development, must support high-quality teaching and learning. Studies of high-achieving educational systems, as demonstrated in the Program for International Student Assessment (PISA), note the following five conditions necessary for a system to move from supporting low-quality to high-quality instruction:

- A committed belief within the highest level of a system that *all* students can learn
- Clear and ambitious learning goals linked to instruction
- Capacity around good instructional practice at every level of the system
- Incentives, accountability, and knowledge management around change
- Commitment on behalf of the educational system to make itself a learning organization in which everyone—from the highest-level administrators to students—is provided with opportunities for continuing learning (Fullan, 2010)

No distance learning system can exceed the quality of the people within the system (Barber & Mourshed, 2007). It is our hope that this guide offers sufficient guidance on improving the quality for teachers and learners within any distance learning system.

## Overview: Distance Education for Teacher Training

Distance education is a planned learning experience or method of instruction where students and instructors are located in different places and times and where information and communication are exchanged through print, digital, or electronic communication media (Keegan, 1996). The United Nations Educational, Scientific and Cultural Organization (UNESCO) and International Centre for Technical and Vocational Education and Training (UNEVOC) define distance education as "an educational process and system in which all or a significant proportion of the teaching is carried out by someone or something removed in space and time from the learner." Distance education requires structured planning, well-designed courses, special instructional techniques, and methods of communication by electronic and other technologies (UNESCO & UNEVOC, 2017).

Distance education is also a broad educational approach characterized by a high degree of variation. Because it is essentially technology-based, its definition is constantly evolving. Such variation includes the types of media or technology used (print, radio, computer); the nature of the learning (workshop, seminar, degree program, supplement to traditional classroom, levels of support); institutional settings (universities, community colleges, school districts, non-governmental organizations, ministries of education); levels of interactivity support (face-to-face, online, blended, none); and the degree of interaction (asynchronous, synchronous, bichronous). Distance learning also is often paired with "open learning" as in "Open and Distant Learning." "Open learning" describes learning situations in which learners have the flexibility to choose from a variety of options in relation to the time, place, instructional methods, modes of access, and other factors related to their learning processes (Caliskan, 2012).

In the context of teacher education, distance learning has more than one aim and audience. It has been used as a *pre-service* teacher preparation method with teacher-candidates, mostly as part of extensive face-to-face preparation (often as part of a formal "dual-mode" institution, such as the University of the West Indies). In both the Global North and the Global South, it has been deployed as an *in-service* vehicle to fulfill a mandate to upgrade the knowledge, skills, and qualifications of an existing teaching force. Predominantly within the Global North, distance education—mainly in the form of Web-based education—serves as a vehicle for *continuing education*, distinct here from in-service professional development—offering enrichment, enhancement, and additional promotions or certifications for teachers. And of course, during COVID-19 pandemic school lockdowns, it became the *de facto* education system for teachers and students across the globe.

Unlike other forms of training, instruction, and professional learning, distance education is inexorably linked to its mode of delivery (Commonwealth of Learning, 2008). Because of the rapid evolution of delivery modes, education experts often refer to "generations" of distance education modes, such as print, multimedia, or Web-based delivery systems (Taylor, 2001). However, such a classification suffers from two weaknesses. First, "generation" implies a linearity and heredity that do not necessarily exist among types of distance education technologies. For example, print and interactive audio instruction (IAI) have been used simultaneously, not merely sequentially, as teacher training media. Nor did print "beget" IAI.

Figure 4 broadly reorganizes these traditional classifications of distance education types based on their predominant technology delivery mode and discusses some of the main models of each. These examples are evolutionary, and they are intended to be demonstrative versus exhaustive.

Second, as enumerated in Figure 4, the evolution and proliferation of new digital delivery modes, particularly the Internet, and the convergence of diverse types of media and platforms blur the neat distinctions between distance education generations. For example, a Web-based distance education system may employ print, audio, video, multimedia, and broadcast elements. Distance education approaches, even largely print-based ones, often use other secondary technologies, such as video and audio, which are at least as powerful, if not more so, than the primary mode for teacher learning. This convergence and blending of multiple distance education modes makes neat categorization challenging, as will often be seen throughout Section I.

The remainder of Section I examines the distance education modes and models outlined in Figure 4.

### Figure 4
### Modes ("Generations") of Distance Education and Main Models of Each
### (Not all of these will be covered in the guide)

| Modes of Distance Education | Models |
|---|---|
| **Correspondence (print-based) mode** | • Books and readers<br>• Lesson guides<br>• Scripted lessons<br>• Self-study guides<br>• Textbooks<br>• Worksheets |
| **Audio-based mode** | • Audio books<br>• Audio conferencing and telephone<br>• Audio over the Internet<br>• Broadcast radio (educational radio, radio soap operas)<br>• Interactive audio instruction (e.g., with radio, MP3 players, phones, CD-ROM players)<br>• Interactive Voice Response<br>• Podcasts<br>• Radio lessons/Radio tutoring<br>• Two-way radio |
| **Visually-based mode** | • Closed-circuit TV<br>• Educational television<br>• Instructional television<br>• Interactive television<br>• Serialized, popular television ("edutainment")<br>• Streaming television/Internet-based TV<br>• Video (non-interactive and interactive) |
| **Computer-based multimedia mode** | • Augmented Reality<br>• Computer-aided Instruction (CAI)/Intelligent Tutoring Systems (ITS)<br>• Digital learning games/Massive multiplayer online role-playing games<br>• Extended Reality<br>• Immersive environments/Virtual Reality/Virtual worlds<br>• Interactive multimedia/Other multimedia<br>• Mixed Reality<br>• Simulations |

| Modes of Distance Education | Models |
|---|---|
| **Web-based mode** | • Asynchronous online (eLearning courses) (via Webcasts or Massive Open Online Courses)<br>• Bichronous online courses (via a Learning Management System)<br>• Choiceboards<br>• Computer-mediated communication (email, discussion boards—e.g., *Yammer*)<br>• HyperDocs<br>• Online classrooms (e.g., Google *Classroom*)<br>• Online communities<br>• Playlists<br>• Portals<br>• Social media<br>• Software-as-a-Service (Web 2.0 tools and proprietary ed tech products)<br>• Synchronous online courses (live meetings, webinars, classes)<br>• Virtual classes/schools (cyber schools) and universities |
| **Mobile mode** | • Apps<br>• Bluetooth headphones<br>• E-readers<br>• Other handheld devices (e.g., gaming consoles)<br>• Phones (feature and smart phones)<br>• Portable media players (MP3 and MP4 players)<br>• SMS (short message service)<br>• Tablets |

## References


Barber, M., & Mourshed, M. (2007). *The McKinsey report: How the world's best performing school systems come out on top.* McKinsey & Company.

Burns, M. (2020, June 10). *Online education's COVID-19 Struggles.* UKFIET-The Education and Development Forum. https://www.ukfiet.org/2020/online-educations-covid-19-struggles/

Caliskan, H. (2012). Open Learning. In N. Seel, *Encyclopedia of the Sciences of Learning.* Springer. doi:https://doi.org/10.1007/978-1-4419-1428-6_52

Commonwealth of Learning. (2008). *Education for a digital world: Advice, guidelines and effective practice from around the globe.* http://oasis.col.org/handle/11599/52

Fullan, M. (2010, October 1). System on the move: The Ontario education strategy. (Presentation to Education Development Center).

Keegan, D. (1996). *Foundations of distance education.* Routledge.

Organisation for Economic Co-operation and Development. (2009). *Teaching and learning: An international survey. 2008 technical report.* http://www.oecd.org/dataoecd/16/14/44978960.pdf

Shulman, L. (1986, February). Those who understand: Knowledge growth in teaching. *Educational Researcher, 15*(2), 4–14. http://www.jstor.org/stable/1175860

Taylor, J. (2001). Fifth generation distance education. *Instructional Science and Technology, 4*(1), 1–14. http://www.c3l.uni-oldenburg.de/cde/media/readings/taylor01.pdf

United Nations Educational, Scientific and Cultural Organization International Centre for Technical and Vocational Education and Training. (2017). *Distance learning.* https://unevoc.unesco.org/home/TVETipedia+Glossary/filt=all/id=154

Section I.

# DISTANCE EDUCATION: MODES AND MODELS

Section I. Chapter 1

# PRINT-BASED DISTANCE EDUCATION

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Print-based distance education courses have proven to be the least expensive—and sometimes the only feasible—modes of teacher training.

## 1.1 Overview

Print-based correspondence courses are the oldest existing mode of distance education. Globally, print or text in one format or another is still the most prevalent form of upgrading the skills of unqualified or underqualified teachers, most notably in Sub-Saharan Africa and South Asia. Print-based distance education courses have proven to be the least expensive—and sometimes the only feasible—modes of teacher training in countries with difficult terrain, poor technology infrastructure, highly dispersed or difficult-to-reach populations, and little budget, equipment, and human capacity for more multimodal means of distance learning.

### 1.1.1 Print versus Text

Because of advances in technology, this chapter distinguishes between *print* and *text. Print* in this chapter is defined as the process used to reproduce text onto paper. It refers exclusively to the paper-based format in which text appears—books, newspapers, guides, magazines, or any other printed publication. *Text* in this chapter refers to written information that is not paper-based but is available digitally (e.g., a *Word* file included in an online course) or is electronically-based (such as written information displayed in a TV program). As an example, if the reader prints this chapter to read it, this is a print-based resource. If he or she reads it on a screen, it is text-based.[1]

## 1.2 Examples of Print-based Distance Learning for Upgrading Teachers' Qualifications

It may be natural to assume that in a hyper-connected world, print is dead. But during COVID-19 pandemic school lockdowns, printed learning packages emerged as a major form of continuing education for many of the world's learners. Print and text-based learning remain major media for teacher professional development, particularly for upgrading of in-service teachers' basic content and pedagogical skills. For example, the multi-year program, Teacher Education in Sub-Saharan Africa (TESSA), uses largely text-based materials. In Namibia—a large, rural, and sparsely-populated country—print–based materials remain the main distance education mode of delivery at The Namibian College of Open Learning (NAMCOL), which prepares many of Namibia's teachers (C.P. Beukes-Amiss, personal communication, April 7, 2022).

As suggested by the examples above, Sub-Saharan Africa has traditionally provided numerous models of print-based teacher education. The remainder of this chapter shares examples of large-scale print-based distance education for teacher professional development, much of it in Sub-Saharan Africa.

[1] In the first of many cases highlighting the increasing convergence of distance modalities, and the editorial executive decisions this spawns, phone-based texting will be examined in *Chapter 6: Mobile Technologies.*

### 1.2.1 Ghana: Untrained Teachers' Diploma in Basic Education (UTDBE)

In the early 2000s, Ghana's successful implementation of Free Compulsory Universal Basic Education (FCUBE) spawned a shortage of qualified primary school teachers, with colleges of education unable to produce enough qualified teachers to meet demand. In response, in 2003, the Teacher Education Division (TED) of Ghana Education Services (GES) launched the Untrained Teachers' Diploma in Basic Education (UTDBE) program to upgrade thousands of unqualified teachers (Graham & Owusu, 2018). UTDBE mailed textbooks and study guides to these teachers as part of its efforts to prepare them for a diploma in basic education.

The UTDBE program used the same curriculum as the formal three-year pre-service program—a Diploma in Basic Education (DBE)—but over a four-year period in order to keep teachers in school. Using the curriculum study guide/syllabus, teachers read their textbooks, completed worksheets and quizzes, and mailed them to their tutors at the nearest teacher training college. Each summer, they met in-person with their regional colleagues and tutors for a month-long summer residential session that focused on instruction. Once they completed this course of study, untrained teachers sat for a national teaching exam, following which, if successful, they received an actual teaching diploma. Evaluation results were generally positive, showing that teachers trained under the UTDBE program had comparable skillsets, and in some cases higher average scores, than those participating in the formal DBE program, and that the UTDBE program was more cost-effective than the DBE program (Associates for Change, 2016; Graham & Owusu, 2018).

### 1.2.2 Guatemala: Threshold for Teacher Change

Where print is the primary source of instruction, support is often furnished through other media. In Guatemala, the Millennium Challenge Corporation's (MCC) *Threshold for Teacher Change* program (2015–2021) supported the upgrading of qualifications of over 1,900 lower secondary school teachers in five Guatemalan departments. Each Saturday, teachers traveled to various university campuses throughout the Guatemalan highlands for daylong face-to-face workshops with university instructors to learn new content and pedagogical approaches. They returned home to study their paper-based study materials, *I Learn and Teach*, over 40,000 copies of which were printed and delivered to support teachers, university professors, and professionals from the Ministry of Education's Department Directorates. These print-based materials were eventually supplemented by a teacher-resource website and tablets so that a select group of teachers could continue with online learning (Millennium Challenge Corporation, n.d.).[2]

## 1.3 Supporting Teachers through Scripted Teaching

Scripted teaching is one of the most common manifestations of print-based instruction. This involves furnishing teachers with scripts, either paper-based or on tablets, which they repeat *verbatim* to their students. Scripted lessons may include prompts about when to walk around the room or ask a question, as well as time allotments for each lesson segment. Scripted teaching is common in many regions of the globe—for example, *Success for All* is a well-known scripted reading program in the United States (Colt, 2005). Scripted lessons are often delivered via print but may also be delivered through audio-based and online instruction, as will be discussed in Chapters 2 and 13.

[2] The program had several areas of focus, including education. The author was involved in the education component of this program from 2017–2019 on behalf of MCC. As of this writing, an evaluation of the teacher upgrading program has not been completed.

Three models of scripted lessons are examined here.

### 1.3.1 Chile: Plan Apoyo Compartido (PAC)

This 2011 initiative, launched by the Chilean government, provided detailed classroom guides, and scripted lecture materials to teachers in schools historically performing below Chile's Sistema de Medición de Calidad de la Educación (SIMCE)—its standardized Education Quality Measurement System national examinations average. Eight hundred and forty-three schools were divided between treatment and control schools. The goal was to standardize pedagogical materials and close academic achievement gaps between the lowest-income student population and the national average.

One year later, reading, math, and science test scores for students in Plan Apoyo Compartido (PAC) schools improved between 0.09 and 0.13 standard deviations[3] relative to comparison schools. The effects were larger in 2012 than in 2011. Researchers attributed this change to program maturation and improved implementation. Overall, the program resulted in persistent and improved academic results over time. However, like many education interventions, the PAC program was most successful in schools with higher socioeconomic status, with test scores improving by 0.20 standard deviations among students from more well-off PAC schools (Bassi et al., 2020).

### 1.3.2 Kenya: New Globe Schools

Formerly known as Bridge International Academies, New Globe Schools is a Kenyan for-profit school chain operating in Kenya, Nigeria, Uganda, Liberia, Rwanda, a Beirut-based camp for Syrian refugee children, China, and India.[4] It provides primary school teachers with tablets that include scripted activities that they follow in order to standardize instruction across their country's primary schools (New Globe Schools, n.d.). Instructions lay out exactly what to write on the blackboard and even when to walk around the classroom. These tablets also are used to assess student learning and feed information back to the head office (via 2G cellular connections) so New Globe can analyze its instructional model and make appropriate adjustments.

New Globe schools reported that students learned in two years what Kenyan primary age students typically learned in three.

A study of 10,000 Kenyan students in New Globe schools reported that students learned in two years what Kenyan primary age students typically learned in three. In academic terms, New Globe increased student learning by 1.35 standard deviations (SDs) for Early Childhood Development students and 0.81 SDs for primary students up to grade 8—effects that, according to the study's lead researcher, are "among the largest in international education literature" (Gray-Lobe et al., 2022, p. 3). Researchers attribute these positive gains to a combination of scripts to standardize quality, the use of tablets for formative assessment and quick data analysis, professional development, and wraparound supports for teachers.

### 1.3.3 Democratic Republic of Congo (DRC) and Cameroon: "Chalkboard Guides"

"Chalkboard Guides" are structured, print-based lesson guides for teachers in emergency contexts

[3] The Standard Deviation (SD) measures the amount of variance across a set of values. A low SD suggests that the values are close to the mean (expected value). A high SD indicates that the values are spread out over a wider range. For purposes of interpretation, Lipsey et al. (2012) provide a more intuitive interpretation of standard deviations. A 0.10 SD means a learner would move from the 50th to 54th percentile; a 0.20 SD means they move from the 50th to 58th; a 0.30 SD means from the 50th to 62nd percentile and 0.40 SD from the 50th to 66th percentile.

[4] New Globe operates its own private schools but also increasingly sells its tools and trainings to local and national education authorities (as in China and Rwanda) so they can run government schools according to the New Globe model.

where resources are especially scarce and learning outcomes are quite low. Developed by non-profit organization Justice Rising, teachers in the conflict-stricken eastern Democratic Republic of Congo (DRC) and in Cameroon are given one-page-per-lesson guides focused on effective use of the chalkboard—hence the name. The guides are based on the tradition of Japanese chalkboard teaching practices—*bansho*—where teachers fill the chalkboard in creative ways to summarize, organize, and link a sequence of lesson events to facilitate collective thinking (Emerling, 2015). The chalkboard guides also draw from cognitive load theory[5] and behavioral science in their design (Ee-Reh Owo, personal communication, May 23, 2022). Teachers take photos of the chalkboard to disseminate to learners.

Scripted lessons are a popular form of embedded teacher professional development and a mechanism to assure quality instruction. Research on scripted lessons, though limited, is generally positive. For example, in a randomized controlled trial (RCT) across 169 rural villages in the Gambia, scripted lesson plans, together with after-school supplementary classes and frequent monitoring and teacher coaching, were credited with improved learning outcomes (World Bank, 2020). RTI International's examination of scripted lesson plans across 13 countries suggests that scripts can provide teachers with situated, just-in-time professional development while standardizing the quality of instruction and improving student learning outcomes *if* teachers adhere to the scripts and *if* the scripts are easy to follow (Gray-Lobe et al., 2022; Piper et al., 2018). Scripted lessons are not without their critics, however, in large part because of their perceived removal of teacher agency, their deprofessionalization of the teaching profession, and mechanization of teaching (Wyatt-Smith et al., 2019).

Research suggests that for scripted lessons to be effective, they must be implemented with fidelity. Modifying scripted lessons—that is, changing the sequence of activities, adding or omitting content, or eliminating or reducing activities—negatively affects the lessons (Piper et al., 2018). While fidelity of implementation is important, particularly as

**Figure 1.1**
**Open Universities**

Open universities are distance education universities that combine various forms of distance technologies with some face-to-face instruction to provide learning opportunities to nontraditional students (students over 21 or working professionals). They are open to all learners, regardless of qualifications, hence the designation "open" university. One of the most venerable is the United Kingdom's Open University, which was founded in 1969 as the University of the Air.

Inspired by the U.K. model, open universities were established in earnest across Asia in the 1980s in order to educate the continent's young population, many of whom were graduating from secondary school with skills that did not equip them for the world of work. Because of their large student populations, these open universities have been termed "mega-universities" and are often the main source of tertiary education in their countries. One example is India's Indira Gandhi National University. With over 7 million students, it is the largest open university—and university—in the world (Indira Gandhi National Open University, 2023).

Open universities are typically "single-mode"—teaching off-campus students but not on-campus ones. However, some are "dual-mode"— offering parallel off-campus and on-campus degree programs or what is increasingly being termed "hybrid" instruction. Chapters 5 and 19 will return to a discussion of dual-mode institutions.

[5] For Sweller (1988), cognitive load theory describes the way human beings process information. Cognitive load can be *intrinsic* (the effort associated with a specific topic), *extraneous* (the way information or tasks are presented to a learner), and *germane* (the work put into creating a permanent store of knowledge or schema). Sweller noted that working memory is able to hold only a small amount of information at any one time. Thus, instructional methods must pay attention to design and presentation of learning activities to avoid cognitive overload.

teachers are learning content and instructional strategies, it may become less so as teachers learn more, discern what works best for students, and begin to outgrow the constraints of the scripted lessons. In this case, teacher professional development (TPD) providers and materials designers may want to allow "adaptation with guardrails"—helping teachers gradually modify aspects of the innovation while sticking to its core elements—or use full scripting initially while eventually reducing to lighter scripting later in the guide or series of guides (Hill et al., 2022; Piper et al., 2018).

## 1.4 Considerations: Print and Text for Distance Education

As noted at the beginning of this chapter, computer technology is increasingly used as a distribution medium for *text-based* instruction, either through content management systems alone or as part of online classes. Such courses are often found in low-bandwidth environments and are often part of open university courses. (See Figure 1.1.) Teachers download *Word* documents and Portable Document Formats (PDFs) and either print them or read them on a screen. Indeed, many open universities use technology, such as Universal Serial Bus (USBs or "pin drives") or the Internet as distribution channels for text-based instruction or as print distribution mechanisms (Latchem & Jung, 2010).

As more distance learners access continuing education via the Internet, tablets, and phones, exclusively print-based correspondence courses are becoming less frequent as they are increasingly bundled with multimedia, video, or audio. That said, remote learning during COVID-19 pandemic school lockdowns was a stark reminder that print still offers compelling strengths as a distance education mode, particularly for students and teachers who lack access to electricity, broadcast services, and/or the Internet.

### 1.4.1 Benefits of Print-and Text-based Distance Education

Print offers numerous benefits as a mode of distance education, several of which are enumerated here.

#### Print is affordable

Print's greatest attraction may be its cost. Both its production and distribution costs are low relative to other forms of distance education. Print is easy to reproduce, portable, ideal for self-study, and a familiar medium for teachers. Paper textbooks can be stored and easily referenced; they are easy to retrieve (reach across your desk); and they don't require a power source (Hollander, 2012).

> The effectiveness of the high-resolution nature of print has been largely corroborated by research on print-based distance education.

#### Print is effective

Print is a far better medium for reading comprehension and learning than a computer screen (Kong et al., 2018). (Figure 1.2 discusses the challenges of reading from a screen.) This may be because paper, in particular two-page spreads, are significantly "higher resolution"—entirely in the learner's field of view—than are digital displays (Tufte, 2001).

The effectiveness of the high-resolution nature of print has been largely corroborated by research on print-based distance education. When and where they were used extensively, print-based correspondence courses overall have shown documented effectiveness vis-à-vis courses taught in conventional settings (Perraton, 1993). However, as will be discussed, print isn't for everyone. Nielsen & Tatto (1993), in their study of in-service distance education in Sri Lanka, reported that exit-level in-service teachers who matriculated through a print-based program scored *lower* (with the exception of language) than did exit-level candidates from colleges of education in teacher training colleges.

**Figure 1.2**
**The Challenges of Reading from a Screen**

What is the problem reading from a computer or phone screen? Simply put, human beings do it badly—mainly for three reasons. The first is "cognitive load" (the cognitive processing demands placed on a person). Scrolling and increasing font sizes clogs our mental bandwidth, increasing extraneous cognitive load, making reading from a screen exhausting and resulting in less capacity to remember information (Skulmowski & Xu, 2022; Sweller, 2010).

Next, given the connected nature of the World Wide Web, we often spend less time on a page before jumping somewhere else, and perhaps not returning to our original reading. Finally, according to studies using eye-tracking software, when we read online, we do so in an "F" pattern, versus reading the entire content as we are more likely to do with a book (Burns, 2019).

Cumulatively, these three online reading behaviors denigrate the process of reading itself. Rather than employing "deep reading" processes—focused, sustained attention to and immersion in the text—online readers spend more time utilizing shallow reading techniques—browsing and scanning, keyword spotting, non-linear reading (Wolf, 2018). These behaviors have serious "downstream effects" that readers have transferred to offline reading—resulting in the inability to comprehend, critically analyze and read long pieces of complex text (Carr, 2011; Wolf, 2018).

#### Print and text-based learning are highly familiar media that have been popularized by technology

The World Wide Web has transformed reading and books into a more collaborative and social experience. Websites such as *Goodreads* are forums for readers to share, discuss, and review books they are reading. Websites such as Google *Books* and *Project Gutenberg* allow users to read thousands of free digitized texts, and free tools like *Calibre* enable learners to create their own virtual library and bookshelves. Chrome browser extensions and apps such as *Hypothes.is*, *Perusall*, and *Kami* make it possible for learners to digitally annotate text on their screens as they read.

Most likely, print will continue to shift from a paper medium to a digital one, as with phones and tablets. These technology platforms can address some of the production and distribution issues associated with print-based documents. But no technology has yet been able to replicate the ease of use, tactile experience, the ability to write in margins, and the ease of navigation of paper.

### 1.4.2 Limitations of Print and Text-based Distance Education

However, there is a variety of challenges associated with print/text-based instruction that weaken its efficacy as the sole source of teacher instruction.

#### Many contexts are print-poor

Developing a print-based distance course is deceptively difficult. It depends on spoken languages having a written alphabet; abundant, quality educational local language content and training materials from which distance providers can choose and which they can afford; and a functioning educational publishing sector with laws around copyright and intellectual property to stimulate both production and publication efforts. Many contexts across the globe lack one or all of these attributes. Thus, many distance programs rely on open educational resources (OER), which in part address such issues, or they end up using out-of-date content. Many distance programs translate existing materials into local languages but these translations may be inaccurate and thus problematic (T. Vitolo, personal communication, June 7, 2022). Print materials may be poorly written, and text may be particularly difficult for learners with disabilities such as dyslexia or even useless for those who are blind or suffer from impaired vision.

Print-based distance learning also suffers from myriad production, copying, and transportation issues. For example, textbooks and associated tests may be poorly constructed and contain errors, which may be hard to correct because of the print-based format. The variable quality of paper, printer toner, and copying machines can make print hard and unattractive to read—seemingly minor points that nevertheless negatively affect legibility, reader interest, and the effectiveness of print as a learning tool. Damage rates from water, heat, and mold are high. Distance education providers often run out of paper and copier toner, postal services are unreliable in many parts of the globe, and it is not uncommon for teachers to report that their textbooks or exams were lost in the mail.[6]

### Many teachers or teacher-candidates may neither like to read nor be particularly strong readers

Many teachers, like their students, may struggle with reading for a variety of reasons. The focus on text disadvantages struggling readers, those who may have reading disabilities, or those who may simply learn better using another modality. In more orally based cultures, print may be a suboptimal learning alternative. Print- and text-based scripted lessons also place large literacy burdens on teachers—particularly in terms of comprehending more academic and technical writing that is often long and complex, which may account for the use of other scripted technologies such as radio and multimedia.

Nor is text the best vehicle for helping teachers learn application of skills, processes, or procedures. This often results in a quantity-absorption tension. Because teachers' knowledge of a certain topic may be low, or a particular skill is complex, authors may create lengthy texts for teachers to read.[7] However, the inefficiency of text as a tool to convey complex information and the length of the text

**Figure 1.3**
**E-readers**

E-readers, slate-like devices that use electronic ink to deliver books digitally, are designed exclusively for reading and thus function like a paper book: The user can turn pages, skip ahead to the end of the book, annotate sections, and save his or her place with a "bookmark."

The benefit of e-readers as a teacher education tool is that they can store hundreds of books and documents, thus mitigating issues associated with physical storage or postal delivery and giving the teacher access to an entire library that is both portable and lightweight. E-readers such as Amazon's *Kindle* or Kobo *Clara HD* have gray backlighting, making them ideal for reading in bright sunshine, and a battery that lasts for weeks or even months. Both can access cellular networks that allow the user to download a book onto the e-reader instantly.

This chapter mentions several of the drawbacks associated with print-based and text-based distance learning. E-readers do not remedy all of these issues—for example, the prerequisite of literacy and the inefficiency of text as a tool to convey complex information—but they do address a number of them, especially the problems of storage and updating information. Many e-readers come with text-to-speech options and support note taking and handwriting. Adjustable font sizes and types make it easier for those with vision problems to use an e-reader than to read a paper book.

However, there is still scant research on the educational benefits of e-readers, particularly in terms of teacher education or adult learning. Data that do exist examine the e-reading experiences of students. One survey of 2,000 U.S. students aged 6 to 17 reported that students who normally dislike reading paper-based books enjoyed reading from digital readers and would read more books if they had e-readers (Bosman, 2010). A more recent series of studies of the reading habits of teens in the U.K., U.S., Portugal, Slovenia, and Finland found that teens still prefer reading from print books (Myrberg, 2017).

[6] Based on the author's experience with distance learning programs in Africa and interviews with UTDBE candidates in 2006 and 2008.
[7] The irony of such a statement is not lost on the author of this several hundred page guide.

needed to impart skills may, in turn, intimidate and deter teachers from actually reading it.[8]

The benefit of e-readers as a teacher education tool is that they can store hundreds of books and documents, thus mitigating issues associated with physical storage or postal delivery

### In the case of text-based instruction, reading from a screen is challenging

Figure 1.2 explains the difficulty of reading and comprehending text on a standard computer screen, tablet, or phone. Comprehension and cognitive-load issues aside, reading from a screen is hard on the eyes and difficult in bright sunlight or natural light, a consideration in many parts of the world.

However, as Figure 1.3 suggests, e-readers can help with these reading issues to some degree. Backlighting can reduce eye strain, readers can increase font sizes, and embedded supports such as dictionaries and text-to-speech supports can mitigate some of the pressures of reading from a digital device.

### Print/text-based instruction suffers from perception problems

Policymakers may regard print-based distance learning—or indeed paper itself—as outmoded. Many agitate for more technology-based forms of distance learning, even when such options are not feasible and even though the technology may, in fact, serve only as an expensive delivery system for print-based learning.

### Print-based courses suffer from high attrition rates

Years of research suggest that print-based distance education courses have traditionally suffered from high attrition rates, largely because they invoke the model of the teacher-learner as a solo practitioner (Nielsen & Tatto, 1993; Perraton, 1993; Potashnik & Capper, 1998). Like Margaret, whose distance education experience was described in the Foreword of this guide, learners, for the most part, study at their own pace with little or no supervision or collaboration with colleagues. When collegiality or supervision occur, they typically do so through annual summer residential sessions that take place away from school, where teacher-learners need the most support when implementing novel ideas or practices. Where there have been exceptions to this solo-learner model and ongoing human supports (study circles and group tutors) and media support (radio and television) have been provided, as in print-based distance courses in Sri Lanka and Indonesia, these print-based programs experienced higher completion rates (Nielsen & Tatto, 1993).

## 1.5 Summary of Print-based and Text-based Distance Education

*Chapter 12: Developing Content* will revisit print again. Figure 1.4 summarizes the role of print-based distance learning and its strengths and limitations as a distance education mode.

[8] Based on the author's interviews with Ghanaian teachers in 2006 and 2008.

**Figure 1.4**
**Overview of Print- and Text-based Distance Education**

| Roles in Teacher Professional Development | Strengths | Limitations |
|---|---|---|
| • They provide self-paced professional development for teachers and access to learning resources.<br>• They often are supplemented by face-to-face institutes/ workshops or by some form of audio instruction.<br>• They frequently are used as a supplement to some other form of media-based distance education (radio or television).<br>• They traditionally have been used in very low-resource environments.<br>• The World Wide Web, e-readers and digital tablets have improved production, reproduction, storage of, and access to text.<br>• Screen readers and speech-to-text programs offer visually impaired teacher-learners access to computer-based text.<br>• Technologies, such as QR codes, can augment print-based information. | • Reading promotes sustained cognition.<br>• Paper works anytime, anyplace. It does not depend on Internet connectivity, technology skills, electricity, or access to hardware and software. Nor does it crash or get infected with viruses or malware.<br>• Print is a versatile and portable form of learning—easily developed, shipped, and distributed, and teachers can carry materials to school or home for study.<br>• Print materials take advantage of the long tradition of the written word to convey information.<br>• Print-based reading has consistently been shown to result in greater comprehension and retention than reading from a digital screen (Carr, 2011; Kong et al., 2018).<br>• Web-based connectivity potentially means greater access to, variety, and dissemination of text-based resources.<br>• Print-based materials are less costly to produce and distribute than other forms of distance education. | • Print-based learning does not allow collaboration between readers—as opposed to text-based digital resources, where teachers can collaborate from distinct locations.<br>• Success is contingent upon a high degree of literacy and enjoyment of reading.<br>• Print materials often lack high-quality or interactive content.<br>• Textbooks can't model behavioral and attitudinal elements of effective teaching, nor can they model interactive instruction.<br>• Print may be better for learning concrete facts and concepts as opposed to abstractions, skills, and behaviors.<br>• Print may be less energy-efficient than simply reading on a screen due to the energy required in printing and copying and the creation and disposal of paper. |

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## References

Associates for Change. (2016). *The impact assessment of the untrained teacher diploma in basic education: Endline study.*

Bassi, M., Meghir, C., & Reynoso, A. (2020, October). Education quality and teaching practices. *The Economic Journal, 130*(631), 1937–1965. doi:https://doi.org/10.1093/ej/ueaa022

Bosman, J. (2010, September 29). In study, children cite appeal of digital reading. *New York Times.* http://www.nytimes.com/2010/09/29/books/29kids.html

Burns, M. (2019, April 14). *To read or not to read: Text in an online world.* eLearning Industry. https://elearningindustry.com/text-in-an-online-world-read

Carr, N. (2011). *The shallows.* WW Norton.

Colt, S. (2005). *Do Scripted Lessons Work-or Not?* PBS. https://www.pbs.org/makingschoolswork/sbs/sfa/lessons.html

Emerling, B. (2015, April 26). *Lessons learned from a chalkboard: Slow and steady technology integration.* Larry Cuban on School Reform and Classroom Practice. https://larrycuban.wordpress.com/2015/04/26/lessons-learned-from-a-chalkboard-slow-and-steady-technology-integration-bradley-emerling/

Graham, A., & Owusu, A. (2018). An evaluation of the untrained teachers diploma in basic education (UTDBE) programme in Ghana. *Journal of Education and Practice,* 9(36), 75–82. https://www.iiste.org/Journals/index.php/JEP/article/viewFile/45781/47265

Gray-Lobe, G., Keats, A., Kremer, M., Mbiti, I., & Ozier, O. (2022). *Can Education Be Standardized?* Evidence from Kenya. New Globe Schools. https://issuu.com/newglobe/docs/can_education_be_standardized_evidence_from_kenya?fr=sZWEzMjUwOTg0NjU

Hill, C. J., Bloom, H. S., Black, A. R., & Lipsey, M. W. (2008). Empirical benchmarks for interpreting effect sizes in research. *Child Development Perspectives,* 2(3), 172–177. doi:10.1111/j.1750-8606.2008.00061.x

Hollander, J. (2012, October 10). Long live paper. *New York Times.* https://www.nytimes.com/2012/10/10/opinion/long-live-paper.html

Indira Gandhi National Open University. (2023). *Indira Gandhi National Open University.* Preamble. http://www.ignou.ac.in/ignou/aboutignou/profile/2

Kong, Y., Seo, Y., & Zhai, L. (2018). Comparison of reading performance on screen and on paper: A meta-analysis. *Computers & Education,* 123, 138–149. https://doi.org/10.1016/j.compedu.2018.05.005

Latchem, C., & Jung, I. (2010). *Distance and blended learning in Asia.* Routledge.

Lipsey, M. W., Puzio, K., Yun, C., Hebert, M. A., Steinka-Fry, K., Cole, M. W., . . . Busick, M. D. (2012). *Representation of the effects of education interventions into more readily interpretable forms.* National Center for Special Education Research, Institute of Education Sciences, United States Department of Education. https://ies.ed.gov/ncser/pubs/20133000/pdf/20133000.pdf

Millennium Challenge Corporation. (n.d.). *Guatemala threshold program: Investing in Guatemala.* Millennium Challenge Corporation: https://www.mcc.gov/where-we-work/program/guatemala-threshold-program

Myrberg, C. (2017). Why doesn't everyone love reading e-books? *Insights, 30*(3), 115–125. http://doi.org/10.1629/uksg.386

New Globe Schools. (n.d.). *The history of New Globe.* https://newglobe.education/newglobe-history/

Nielsen, H., & Tatto, M. (1993). Teacher upgrading in Sri Lanka and Indonesia. In H. Perraton (Ed.), *Distance education for teacher training* (pp. 95–135). Routledge Press.

Perraton, H. (Ed.). (1993). *Distance education for teacher training.* Routledge Press.

Piper, B., Sitabkhan, Y., Mejia, J., & Betts, K. (2018). Effectiveness of teachers' guides in the in the Global South: Scripting, learning outcomes, and classroom utilization. *RTI Press Publication No. OP-0053-1805.* https://doi.org/10.3768/rtipress.2018.op.0053.1805

Potashnik, M., & Capper, J. (1998). *Distance education: Growth and diversity.* World Bank.

Skulmowski, A., & Xu, K. (2022). Understanding cognitive load in digital and online learning: A new perspective on extraneous cognitive load. *Educational psychology review,* 34, 1–26. https://doi.org/10.1007/s10648-021-09624-7

Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science, 12,* 257–285. https://onlinelibrary.wiley.com/doi/epdf/10.1207/s15516709cog1202_4

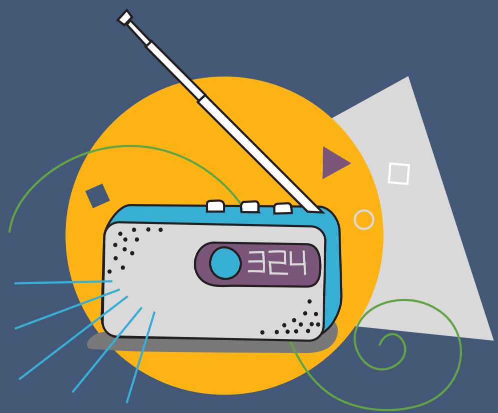
Sweller, J. (2010). Element interactivity and intrinsic, extraneous, and germane cognitive load. *Educational Psychology Review, 22*(2), 123–138.

World Bank. (2020). *Cost-effective approaches to improve global learning: What does recent evidence tell us are "Smart Buys" for improving learning in low and middle income countries?* The World Bank. https://documents1.worldbank.org/curated/en/719211603835247448/pdf/Cost-Effective-Approaches-to-Improve-Global-Learning-What-Does-Recent-Evidence-Tell-Us-Are-Smart-Buys-for-Improving-Learning-in-Low-and-Middle-Income-Countries.pdf

Tufte, E. (2001). *The visual display of quantitative information* (2nd ed.). Graphics Press.

Wolf, M. (2018, August 25). Skim reading is the new normal. The effect on society is profound. *The Guardian.* https://bit.ly/2BMd3Bb

Wyatt-Smith, C., Lingard, B., & Heck, E. (2019). *Digital learning assessments and big data: Implications for teacher professionalism.* UNESCO Education Research and Foresight-Working Papers. https://unesdoc.unesco.org/ark:/48223/pf0000370940




Section I. Chapter 2

# AUDIO-BASED DISTANCE EDUCATION

## Table of Contents

Audio-based instruction has delivered learning to teachers and students even in the face of formidable obstacles.

## 2.1 Overview

Since the 1920s, audio-based instruction has enjoyed an enviable track record as a proven mode of distance learning. Over the decades, programs such as the British Broadcasting Corporation (BBC's) "wireless" education in the 1930s; two-way Schools of the Air that delivered formal schooling to children in "bush schools" in Australia's remote outback beginning in the 1950s; the first Interactive Radio Instruction program, *Radio Math*, for Nicaraguan children in 1974; and *English for Latin America* (ELA), Education Development Center's (EDC) current English-language audio program for students and teachers in Latin America have revealed the power of the human voice and of the spoken word to engage, entertain, and instruct.

Audio-based instruction has delivered learning to teachers and students even in the face of formidable obstacles. Primarily through broadcast and interactive audio instruction, audio programming has reached students and their teachers in areas of conflict in Mali; afforded educational continuity to 58% of the world's learners during COVID-19 pandemic school closures;[1] and ensured home learning access during 2014 Ebola outbreaks in Liberia and Sierra Leone (Education Development Center, 2020; Gutierrez & Wurie, 2021). In addition to its reach, audio's potential as a mode of distance education rests in its accessibility—it can be accessed via phones or through radio, the most commonly owned technology device across the globe, listened to weekly by three billion people (Social, 2022)—and its ease of use. Radio, as well as other forms of playback devices for audio programming—phones, MP3 players, CD-ROM players—are simple technologies that teachers often know how to use.

This chapter explores the more established forms of audio delivery—radio broadcasts, two-way radio, and radio lessons—and it discusses emerging models of audio-based instruction—Internet-based audio, interactive voice response, podcasts, and audiobooks. Its focus, however, is on the most successful model of audio-based instruction for both student and teacher learning: interactive audio instruction.

All of these distance-based teacher education models are examined in the next section.

## 2.2 Models of Audio-based Instruction for Teachers

No other model of distance education approaches the success of interactive audio instruction (IAI) as a tool, not just for student learning but for teacher

[1] Audio-based instruction used either alone or as one component of distance education programming, as reported by the United Nations Children's Fund (UNICEF) in a survey of 127 countries (UNICEF Latin America and the Caribbean Section, 2020). These included countries with relatively strong Internet access: Argentina, Bolivia, Chile, Colombia, Costa Rica, Ecuador, El Salvador, Honduras, Panamá, Perú, México, Cuba, and Venezuela. Few countries used audio-instruction alone for remote learning.

learning (See Figure 2.1 for its overall impact on student learning.). Interactive audio instruction has evolved over the decades to respond to some of the most pressing needs in education, such as continuing education in times of pandemic, epidemic, conflict, and crisis. It has delivered education to the most vulnerable learners, such as internally displaced children or orphans in Sub-Saharan Africa; children in post-conflict settings in South Sudan, Somalia, and the Democratic Republic of Congo; and in classrooms where there are no teachers. Increasingly it has been deployed to augment the content knowledge and skills of teachers as it educates students.

### 2.2.1 Interactive Audio Instruction

Interactive audio instruction or IAI is a comprehensive instructional approach to teaching and learning with audio-based instruction at its core. It involves the use of *one-way audio transmission* to reach *two audiences* (students and their in-class teachers)—a "dual audience, direct instruction" approach. Lessons are delivered by either (1) radio *broadcasts* (thus, often termed "Interactive Radio Instruction") or (2) the use of audio-based technologies, such as MP3 players, memory cards, USBs, CD-players, or phones, connected to speakers and delivered to a defined, smaller audience according to the class schedule (a process known as *narrowcasting*). IAI combines highly scaffolded classroom-based engaging learning activities, exercises, and stories encouraging student participation led by the "audio teacher."

Both the content and activities of the audio programs are based on the national curriculum and use a series of structured learning episodes. Within classrooms or learning centers, audio broadcasts typically run approximately 30 minutes and integrate games, songs, stories, and activities that encourage problem solving and self-directed exploration into the formal curriculum. Programs cover a range of subject areas in early childhood and basic education, as well as nonformal and

**Figure 2.1**
**Interactive Audio Instruction for Student Learning**

It is not possible to fully appreciate interactive audio instruction without documenting its impact on *student* learning. Decades of cumulative research beginning in the 1970s essentially concur that exposure to IAI is associated with higher levels of student achievement compared to students *not* exposed to IAI (Ho & Thukral, 2009, p. 1). While effect sizes[2] range from small (.24 in Thailand) to large (.94 in Bolivia), IAI has improved learning outcomes in conventional classrooms by between 10% and 20% when compared with control classrooms not using IAI (Ho & Thukral, 2009; Tilson et al., 1991).

Evidence-based research from contexts such as Kenya, South Africa, Malawi, India, Sudan, Pakistan, Zanzibar, the Democratic Republic of Congo, Liberia, Cabo Verde, and Zambia have demonstrated IAI's significant role in improving students' language learning performance (Education Development Center, 2009; Hanemann, 2018; Ho & Thukral, 2009; Leigh, 1995; Ministry of Education and Vocational Training, Zanzibar and Radio Instruction to Strengthen Education (RISE), 2009, p.7).

Analyses of interactive audio instruction across several countries—Bolivia, Honduras, El Salvador, Zanzibar, and Indonesia—suggest that audio-based instruction promotes early childhood literacy and numeracy for vulnerable students such as orphans and children who initially scored lower than those in the control group (Education Development Center, 2014, 2020; Ho & Thukral, 2009, pp. 25, 27, 31; Ministry of Education and Vocational Training, Zanzibar and Radio Instruction to Strengthen Education (RISE), 2009, pp. 24, 25).

[2] An effect size specifies the number of standard deviation (SD) units separating the outcome scores of treatment and control groups in a study. An effect size is positive when the treatment group in a study outperforms the control group; it is negative when the control group outperforms the treatment group. Effect sizes of around 0.2 are typically considered to be small; 0.5, moderate, and 0.8, large in size. Effect sizes above 0.25 are considered large enough to be educationally meaningful (Cohen, 1988; Slavin, 1990). For a more complete definition of effect sizes see *Appendix 2: Glossary*.

accelerated programming for youth and adults. The methodology of IAI employs a range of pedagogical approaches that focus on leveraging audio content with learning activities, exercises and stories encouraging student participation and interaction, teaching guides, teaching and learning materials, out-of-class teacher professional development, and, in some cases, coaching (Education Development Center, 2014).

In this dual-audience direct-instruction approach of IAI, the audio teacher is not "live" (as in Schools of the Air, discussed below) but prerecorded. Once the in-class teacher turns on the radio or MP3 player, the audio "teacher" delivers content and orally directs the in-class teacher to apply a variety of interactive instructional approaches within his/her classroom. The participatory nature of the guided lessons engages learners in multiple ways—"cognitively, physically, emotionally, creatively and socially" (Christina & Louge, 2015, p.3).

## IAI for Teacher Professional Development

As highlighted in Figure 2.1, interactive audio instruction has a robust longitudinal body of large-scale, multi-subject, and multi-country evaluations examining student performance on a range of measures. IAI also possesses an increasingly cumulative body of evidence demonstrating its power as a tool for *teacher learning*. Many of these evaluations employ control groups to examine teacher performance in a variety of subjects (math, French, Lingala, Bahasa Indonesian, English) and in a variety of contexts (Cabo Verde, the Democratic Republic of Congo, Guinea, India, Indonesia, Liberia, Madagascar, Mali, South Africa, and Zanzibar) and are examined in the next several pages of this section.

**IAI can provide professional learning for teachers who would otherwise be unable to access it**. In many parts of the globe, teachers are unable to access professional development for a variety of reasons—an insecure environment, cultural constraints, lack of professional development opportunities, expense, family responsibilities, or distance.

**IAI offers in-class, just-in-time professional learning for such teachers (Education Development Center, 2014; Morris & et al., 2015).** Just-in-time professional development integrates teacher learning as the teacher needs it—with actual implementation of the strategy. This convergence eliminates issues of latency—the time lag between learning and implementation. By providing in-class, just-in-time learning, IAI allows teachers access professional learning while still attending to other responsibilities once the school day ends.

As will be discussed, this just-in-time, classroom-based support can improve teacher effectiveness and enhance previous teacher preparation. This is especially pertinent when teacher training or knowledge is low, in geographies/subject-matter areas where there is a scarcity of teachers, and for hard-to-teach topics (Gutierrez & Wurie, 2021, p. 23).

**IAI provides highly structured, high quality professional development.** Studies of effective teacher professional development note that it engages teachers in active learning, is situated in the contexts in which teachers teach, and is highly supportive (Darling-Hammond et al., 2017; Desimone & Stuckey, 2014). As a model of pre- and in-service distance education, IAI is aligned with many best practices in professional development that provide demonstrable teaching and learning benefits (Evans & Pier, 2008; Gaible & Burns, 2007; Ho & Thukral, 2009; Richmond et al., 2021).

At its core, each IAI program is a small, highly scaffolded, in-class professional development session for the teachers. During each program, teachers are asked to follow an instructional model that accomplishes three purposes: students learn; teachers learn to teach better through hands-on practice under controlled conditions (as opposed to more abstract training that happens outside of the classroom); and teachers come to understand the linkages between good classroom practice and improved learning (Gutierrez & Wurie, 2021, p. 7).

Audio programs essentially provide live coaching and support to teachers in ways that other technology cannot. The approach is both empowering and repetitive; thus, over time, teachers often are able to internalize the teaching method cultivated by IAI (Gaible & Burns, 2007; Thukral, 2016, as cited in Richmond et al., 2021).

**IAI can be used to support teachers who have had little or no initial teacher preparation**. Teacher preparation systems, where they exist, often are weak. In Sub-Saharan Africa, in particular, as discussed in Figure 2.2, the quality of pre-service education is particularly problematic, with many teachers receiving no preparation at all. IAI is especially germane in such contexts because it can guide and support community volunteers, paraprofessionals, and even secondary-level students who serve in place of trained teachers (Damani & Mitchell, 2020; Gutierrez & Wurie, 2021).

In Malawi, EDC, in partnership with USAID, the Ministry of Education Science and Technology (MEST), and the Malawi College of Distance Education (MCDE), utilized *Tikwere! (Let's Climb!)* IAI programs as part of a formal distance learning program for pre-service teachers. Cohorts of pre-service teachers gathered weekly in listening circles as IAI programs led them through reviews of their course work and practical discussions on the application of instructional skills (Education Development Center, 2012; Richmond et al., 2021).

The above professional development-related benefits are valuable. But the real worth of any type of teacher professional development is its translation into improved teacher practice and

**Figure 2.2**
**Initial Teacher Preparation in Sub-Saharan Africa**

Because of poverty, weak education systems, and civil strife, future teachers in Sub-Saharan Africa (SSA) may enter their initial preparation with a low level of education. Results from the 2019 Programme for the Analysis of Education Systems (PASEC) revealed that a majority of students in Francophone SSA were below the "sufficient" threshold in reading and mathematics at the end of the primary cycle. In practical terms: More than 72% of these students could not read more than 20 letters in one minute (Conférence des ministres de l'Éducation des États et gouvernements de la Francophonie, 2020).

Education systems with weak potential teacher candidates are further hampered by low, unclear, or non-existent selection criteria for candidates wishing to matriculate through pre-service teacher training. Bonnet (2005) notes that more than half of teacher candidates in Anglophone and Francophone Africa have attained upper secondary education, but in many cases without a diploma. In Mali, the qualifications of pre-service teacher candidates have often been so low upon their arrival in pre-service teacher training colleges that they drop out at high rates because they cannot complete basic pre-service teacher coursework. Giorgi & Christmann (2009) report that, unlike other research to the contrary, even having a baccalaureate degree does not necessarily translate into better performance (cf. Morris et al., 2015).

Secondary school teachers in Anglophone countries generally tend to receive more pre-service preparation than their Francophone counterparts (Tilak, 2009). Though dated, the most recently available information shows that only 27% of teachers in Chad have received training and 36–37% in Madagascar and Togo (Tilak, 2009).

Across the Sub-Saharan region, situations are highly diverse. While teachers in Cabo Verde and South Africa are required to have a four-year bachelor's degree, 2006 data from Lesotho showed that only 58% of its secondary school teachers received initial preparation (Education International, 2007). In rural areas, conflict zones, and countries with large internally displaced populations, many of those teaching, including contract and volunteer teachers, have received no initial preparation to teach (Lauwerier & Akkari, 2015).

improved student learning outcomes. Here, results of IAI are noteworthy and supported by data.

**Improved teaching quality is linked to participation in IAI.** IAI has been linked to improvements in the quality of teaching and these effects appear to be positively associated with more frequent participation in IAI. For example, data from the Democratic Republic of Congo (DRC) and India suggest that documented improvements in teaching practice were most influenced by the degree to which teachers listened to IAI and their participation in continuing professional development activities in which IAI played a central role (Education Development Center, 2014; Ho & Thukral, 2009; Richmond et al., 2021).

In EDC's Projet d'Amélioration de la Qualité de l'Éducation (2009–2014), a five-year, USAID-funded literacy project in the DRC, data from 45 experimental schools in three provinces found that changes in teacher practice were most influenced by their IAI listenership rate—14.2% of the variance in teachers' change in *overall instructional practices* could be explained by their rate of IAI listenership (p=.004, ES=0.37) (Education Development Center, 2014, p. 9). Additionally, continuing professional development activities accounted for 18.3% of the variance in teachers' gains in *general classroom practices* (p=.012, ES=-.42) (Education Development Center, 2014, p. 10). More critically, IAI appears to have spillover effects. In a study of 37 IAI programs at Education Development Center, observations of teachers who use IAI reported that their instructional practice in *non-IAI* classes also improved and that they more frequently "utilized active learning techniques in lessons independent of radio guidance" (Ho & Thukral, 2009, p. 2).

**IAI can mitigate variability in teacher quality.** Like instructional television, which will be discussed in the next chapter, well-designed IAI programs may be able to compensate for variability in local teacher quality and preparedness and poor instruction. For instance, rural students in Bolivia, Thailand, and South Africa who were taught by less-qualified teachers but who participated in IAI programming attained test scores that were as high or almost as high as those for urban students (Anzalone & Bosch, 2005).

Since it is so highly scaffolded, IAI can compensate for the learning curves required of a novice teacher with little degradation in the quality of instruction because teachers, like their students, react verbally and physically to prompts, commands, questions, and exercises posed by audio characters (Gaible & Burns, 2007). Research from India suggests that after approximately 50–60 program episodes, a poorly prepared teacher will grow in confidence and begin to "mimic the instructional skills demonstrated by the radio teacher, providing more feedback, encouragement, and elaboration for students" (Thukral, 2016, as cited in Richmond et al., 2021, p. 28).

In many locations, educational quality is impacted by high rates of teacher absenteeism. Because lessons are pre-recorded or broadcast according to a pre-set schedule, students who participate in IAI may simply do better because they have been exposed to the entire curriculum planned for that school year and are thus not as adversely impacted by teacher absenteeism as may be the case in non-IAI settings.

**IAI can result in documented improvement of teacher knowledge.** Teachers' knowledge—in particular, of content, the language of instruction, how children learn, and the best approaches to optimize learning—is foundational to good teaching, as will be discussed in Chapter 8 (Desimone & Stuckey, 2014). IAI's impact on teacher learning has been extensively documented. IAI initiatives have proved effective in imparting basic content knowledge to teachers as well as to students—particularly when IAI is combined with professional development, teaching materials, and supported group study (Anzalone & Bosch, 2005; Education Development Center, 2014; Perraton, 1993).

Data from South Africa, Guinea, Madagascar, Comoros, and the Democratic Republic of Congo suggest that IAI can improve teachers' knowledge of the language of instruction (Education Development Center, 2009; Education Development Center, 2014; Evans & Pier, 2008; Potter & Naidoo, 2009; Richmond et al., 2021), knowledge of reading optimal instructional practices (Education Development Center, 2014; Ho & Thukral, 2009), and awareness of the cognitive development of young learners and how they learn (Morris et al.,2021).

**IAI can result in positive changes in teachers' instructional practices.** As will be emphasized throughout this guide, particularly in Chapter 8, good teaching matters. Where IAI has been used exclusively as a professional development tool to build teachers' skills, observational data suggest that IAI can help teachers employ research-based instructional approaches including student-centered, child centered or active learning techniques.[3] Consequently, teachers have a better understanding of "pedagogical concepts emphasized by (programs)" and (are) "able to utilize active learning and student-centered techniques in lessons" (Ho &Thukral, 2009, p. 37; Thukral, 2016, as cited in Richmond et al. 2021, p. 20; see also Evans & Pier, 2008).

The above claims are substantiated by the following three examples.

In Madagascar, following participation in IAI, teacher surveys revealed that the percentage of teachers using targeted student-centered instructional practices rose from 58% to 96% according to teachers (Evans & Pier, 2008). Teachers reported that IAI programs had helped them:

- learn new games (83% of teachers) or songs (82% of teachers) to use with their students;
- involve students in their own learning to a much larger degree than before IAI (91% of teachers);
- use group or pair work with students (91% of teachers);
- make learning more interesting for students (85% of teachers); and,
- employ new teaching techniques or strategies generally (90% of teachers) (Education Development Center, 2009).

In Mali, the USAID-funded, EDC-administered Formation Interactive des Enseignants par la Radio (FIER) project, an educational radio program, reported significant positive effects on teachers' use of child-centered interactive teaching practices. Also in Mali, audio-based instruction supported the delivery of the new curriculum and the coaching of teachers in reformed reading instruction (Richmond et al., 2021).

As Chapter 8 will elaborate, pedagogical content knowledge—that is, understanding one's subject area and knowing how to teach it—is essential for student learning. Data from EDC's aforementioned PAQUED program in the DRC, document that first- and second-grade teachers, as part of an IAI programming, increased the amount of instructional time they spent on reading subskills, such as comprehension and fluency (Education Development Center, 2014). Within a year of IAI programming, students in experimental schools, whose teachers utilized IAI and received professional development, significantly outperformed students in control schools. Teachers' gains in instructional practices related to fluency-building, vocabulary-building, and comprehension-building, were significantly linked to IAI listenership, suggesting that teachers may have been "transferring the modeled practices embedded within the IAI programs and applying them to their own teaching" (Education Development Center, 2014, p. 10).

[3] These terms are synonymous.

These changes in teachers' instructional practices have been observed in other contexts— Zanzibar, India, Indonesia, Malawi, and Guinea. In all of these locations, observations have documented that, as noted previously, changes in teaching practice are most influenced by how much teachers listen to IAI and the degree to which they participate in continuing professional development activities in which IAI plays a significant role (Burns, 2006; Education Development Center, 2009, 2012, 2014; Ho & Thukral, 2009; Thukral, 2016, as cited in Richmond et al., 2021).

**When combined with ongoing professional development, coaching, support guides, and teaching materials, IAI can help teachers implement new instructional approaches with a high degree of fidelity.** The instructional improvements in the previous paragraphs result in large measure from teachers' abilities to apply evidence-based reading practices with a high degree of fidelity. Fidelity of implementation is often further supported by visits from a coach, school-based trainings, additional school-based support, and group reflection activities to help teachers enhance their knowledge of reading instruction and support their adoption of new practices.

For example, in the PAQUED program discussed previously, the ensemble of IAI interventions and supports—new skills, the use of a teaching guide, reading materials (read-aloud books, leveled readers), and teachers' participation in weekly and monthly continuing professional development—was "positively and significantly linked" to teachers' adherence to the program of reading activities (Education Development Center, 2014, p. 8). Their involvement in professional development helped teachers come to understand how children learn to read, identify the fundamentals of skilled reading instruction, become aware of their own beliefs about how children learn to read, and reflect on their practice as they learned from their experience, their peers, and their coaches. These realizations, combined with structured IAI programs, helped teachers employ the reading program as designed (Education Development Center, 2014, p. 8). Indeed, 14.3% of teachers' overall knowledge of reading instruction was found to be predicted by how faithfully they applied this program (Education Development Center, 2014, p. 8). This "faithful application of prescribed instructional techniques and strategies was strongly correlated with improvements in students' reading performance" (Education Development Center, 2014, p. 5).

**IAI can support changes in teacher attitudes and dispositions.** For teachers to change practice, there must be changes in their understandings, beliefs, and values (Education Development Center, 2014). Observational evidence of IAI's impact on teachers' attitudes is strong, with teachers in many programs reporting that IAI has increased their motivation, enabled them to overcome embarrassment at their lack of subject mastery, changed their approaches to teaching and learning, helped them focus "less on the mechanics of a practice and more on how to adapt it to their students' needs," made them more gender-sensitive in their classrooms, and reinforced positive attitudes toward teaching (Anzalone & Bosch, 2005; Burns, 2006; Ho & Thukral, 2009; Education Development Center, 2014, p. 8; Masoud, 2020, as cited in Morris et al., 2021).

Evaluation data from Bolivia, Honduras, Zanzibar, and Indonesia show that early childhood caregivers who used IAI lessons in their centers scored higher on measures of positive interaction with children than did their control peers and were consistently more positive in their reviews of children's attention levels, skills, and general enjoyment of learning activities than were caregivers in control classrooms (Ho & Thukral, 2009, p. 26; Morris et al., 2015). The IAI lessons helped caregivers acquire skills that improved their interaction with their students and their delivery of lessons. Across treatment groups, IAI lessons also added value to the time children spent with caregivers. In Malawi, where 25,000 teachers and 2.7 million students participated in the IAI-based initiative *Tikwere* from 2007–2012, evaluation data demonstrated significant improvement in caregivers' skills in providing effective early childhood instruction (Education Development Center, 2012).

Not every IAI intervention is successful. Those that are share several commonalities. First, while, IAI can serve as stand-alone teacher professional development it works best when packaged as part of an overall approach of self-study, study groups, trainings, and support (Education Development Center, 2014). Next, successful IAI interventions often have "relatively well-funded evaluation components, often (teach) a single subject, and (focus) almost entirely on improving quality" (Ho & Thukral, 2009, p. 2). Third, successful IAI interventions constantly update content, ensure rigorous mechanisms of control of the quality of learning, and consider teacher and student needs in terms of design (Christina & Louge, 2015). Finally, unlike other technology interventions that bypass the teacher to work directly with students (as will be discussed in the next two chapters), successful IAI interventions empower teachers. It is teachers themselves, and their actions, "which generate interactivity (and) make IAI most effective compared with other education radio programs" (Gutierrez & Wurie, 2021, p. 14).

### 2.2.2 Educational Broadcast Radio

*Broadcasting* is the transmission of audio content to a dispersed audience across a region or country via radio transmitters. Anyone with a radio can then tune into the programming.

Broadcast radio has long been a popular model of distance-based teacher instruction, primarily in terms of upgrading existing teachers' content knowledge skills. As a teacher training tool, it has been utilized in countries where radio is a common technology and radio infrastructure pervasive; where radio listening is a primary source of entertainment and information; where television is often unavailable or less available; where Internet connectivity, computers, and computer-literate teachers are in short supply; and where radio can substitute for the absence of a well-developed and widely distributed corps of teacher trainers and professional development opportunities. Even more than print-based instruction, broadcast radio has proved to be a successful means of conveying information to teachers, particularly in areas of conflict, areas marked by difficult terrain, and locations that are remote and isolated. Indeed, educational broadcast radio enjoyed a renaissance during COVID-19 pandemic school lockdowns, particularly in Latin America as part of countries' "I Learn at Home" remote learning initiatives (Burns, 2020; Cobo et al., 2020).

An example of how educational broadcast radio often works is provided by Radio Bhutan, operated by the Bhutan Broadcasting Service. Radio Bhutan provides education information to teachers and students in the national language, Dzongkha, as well as in English, Lhotshamkha, and Tshanglakha, mainly via airwaves and in some places through the Internet (Bhutan Broadcasting Service, 2022). It is typically broadcast in rural communities where Internet access is unavailable. Listeners to a particular radio program can request that radio broadcasters research specific information, which is then broadcast on the radio program. Many educational broadcast programs such as Radio Bhutan have generally evolved into Internet-based audio or other forms of distance education—mainly online learning.

#### DIKLAT SRP: Indonesia

One of the most enduring models of broadcast radio for teacher training was Indonesia's DIKLAT SRP, an in-service radio broadcast program, which began in 1975 to help primary school teachers in 21 Indonesian provinces implement the country's new curriculum. The program was administered by Indonesia's Center for Information and Communication Technology for Education (PUSTEKKOM) and the teacher training curriculum was developed by Indonesia's Open University. Teachers participating in DIKLAT SRP were required to complete six learning packages over three years, focusing on Indonesian language, science, mathematics, and social studies, curriculum and instruction, and additional topics such as basic education and educational psychology.

Teachers were given a paper-based test at the end of each package. Those who passed the test received a two-credit Certificate of Accomplishment counting toward teachers' promotion and receipt of their Diploma II.

One hundred and sixty radio programs were broadcast twice daily, six days per week. Teachers, organized in learning groups under the coordination of the school principal, first read their printed materials, then listened to that day's 20-minute radio broadcast on a government-issued radio provided to each school. Broadcasts were followed by a 10-minute discussion facilitated by the school principal, who was trained in the face-to-face Primary School Teachers' Development Project.

The program ended in the mid-1990s. Evaluation of DIKLAT SRP teachers indicated that broadcast radio provided extensive reach to teachers across Indonesia's vast archipelago, which enabled professional development that might otherwise not have been possible. No significant difference was found between the skills of teachers who went through face-to-face professional development and those receiving professional development via radio (Sadiman, 1999).

There is research suggesting that these programs may have constrained teacher learning as much as they helped it. Teachers reported concerns about the quality and length of DIKLAT SRP programming, suggesting that episodes were too short and topics not sufficiently developed. Much of the content of the Diploma II curriculum (56 of 80 credits) could not be broadcast either via DIKLAT SRP or Indonesia's follow-on radio broadcast program for teachers, *Diploma 2 by Air*, because radio was not a suitable medium for delivering more complex types of activities (Gafur, 1994, as cited in Sadiman, 1999).

### 2.2.3 Two-Way Radio: Schools of the Air

Another model of audio-based distance education is *interactive two-way radio*. In this approach, a distance teacher provides instruction and guides students and an in-class teacher (typically in isolated and hard-to-reach locations, as will be discussed) through the national curriculum. Unlike radio broadcasts or IAI, two-way radio allows live back-and-forth communication between the teacher and students.

Australia's Schools of the Air (SOTA) is the most well-known example of this approach. Launched in the early 1950s and still ongoing, two-way audio high-frequency radio transceivers are used to send and receive lessons and messages to and from students in the Northern Territories and Western Australia and their radio teacher in

**Figure 2.3**
**Interactivity**

Though frequently used, the term "interactivity" is often ill defined. Software vendors are fond of stating that a particular application is "interactive" because learners can click, select, or exercise a certain degree of choice. But as Sims (2003) notes, "interactivity" is a far more involved cognitive and affective process that encompasses the following features:

- Interaction with an object or person in a way that allows learners to improve their knowledge and skills in a particular domain
- Multiple communication between learners around an object of study, a tool, or an experience
- Learner control and program adaptation based on learner input
- Reciprocal processes of information exchange and sharing ideas between students and teachers
- Multiple forms of synergistic participation and communication that aid the development of meaningful learning (Sims, 2003)

The term, "interactivity" recurs throughout this guide.

Canberra, Darwin, or Brisbane. Like instructional television, discussed in the next chapter, students typically interact with the radio teacher (the teacher of record) and with other students around Australia at regularly scheduled times during the day (Australian Government, 2011).[4] SOTA also provides access to curricula and instruction in remote primary and secondary schools where teachers may not be certified to teach a particular content area, or where curriculum and materials may be lacking. This use of shortwave transceivers for synchronous, omni-directional communication was the first example of educational technology being used to create a "community of learners" (Fowler, 1987).

Schools of the Air exist in every Australian state except Tasmania. All learning equipment, including radios, is furnished by the Australian government. The exact configurations of students and teachers varies across and within states, depending on geography, density, and the availability of an adult to be the in-class teacher. For example, in some locations, students may have in-person classes with a teacher (who may or may not be certified) during mornings and with the radio teacher in the afternoon (or vice versa). Schools of the Air also offer tutoring (Crump et al., 2010).[5]

As with educational broadcast radio, SOTA have constantly updated their technologies. In the late 1990s, several schools shifted from radio to telephone networks. In 2009, most schools switched from shortwave radio to wireless Internet technologies to deliver lessons that include live one-way video feeds and two-way audio. These tools have been supplemented by video cameras, Internet access, and interactive whiteboards (IWBs), enabling teachers at the studio sites to give lessons via satellite to learners who have Internet access. Students can watch and respond in real time via Web cameras attached to their computer or via synchronous collaboration tools, thus providing greater interactivity between students and teachers, among students in varying remote locations, and between students and the learning material. (Figure 2.3 explains the term "interactivity.") As well as providing two-way audio and video, students can email teachers and each other, interact with the IWB, and answer pop-up questions. They also can hear their classmates and participate in live group discussions.

Research on the effectiveness of SOTA is hard to come by. An overview of 60 years of SOTA information suggests that the educational results of the School of the Air students have been higher than comparable results obtained by traditional (in-person) schools' students, though this could be attributable to a host of other factors, including high teacher-to-student ratios. The same research suggests benefits for families and communities, but nothing for teachers (Catalano, 2018).

Like IAI and instructional television, Schools of the Air have been used to support unqualified teachers, but unlike IAI, data regarding SOTA's impact on teacher effectiveness are inaccessible. Despite this absence of evidence, two-way radio still may be a potentially feasible and useful model of teacher training in certain contexts. More accessible and rigorous evidence, though, is needed to substantiate such an assertion.

### 2.2.4 Radio Lessons

While broadcast radio programs and Interactive audio instruction provide in-service instruction to existing teachers, other forms of audio-based instruction have been developed to support community volunteers or university-aged learners serving as teachers. One common form of audio-based instruction for teachers and students is radio lessons. (Figure 2.4 outlines their use in Cabo Verde).

[4] In extremely remote areas where there are no other students, a student may work alone using his/her high-frequency radio and printed material.
[5] To see a particular School of the Air in action, visit Kimberley School of the Air at https://www.ksota.wa.edu.au/

Radio lessons are what they sound like: radio programs (typically) that broadcast instruction into a classroom. Like IAI, they serve as a master teacher, often supporting volunteer teachers who are teaching on an emergency basis.

**Figure 2.4**
**Educational Radio in Cabo Verde**

Cabo Verde, a sparsely populated archipelago of 10 islands off the coast of west Africa, has relied on educational radio for years. All Cabo Verdeans have access to radio, and it is part of the background noise of the country. Indeed, "distance education" in Cabo Verde is essentially radio-based education. The Law of Foundations of the Education System of Cabo Verde recognizes it as a "special modality" and mandates that students receive academic credit for participating in radio-based distance education programs (Hanemann, 2018).

The small island nation initiated its national educational radio service in 2003. Three years later, it launched radio tutoring programs for adults and out-of-school youth. These tutoring programs—*Radio Escola*—are intended to enable any learner to access education, regardless of literacy skills, levels of formal education, or economic status. The programs are supported by print packages of learning materials distributed to learners. Over the course of 30 minutes, the radio tutor explains a topic and learners complete a lesson following the radio tutor's instructions. Learners can phone in with questions (Burns et al., 2019). Twenty-eight of Cabo Verde's radio instructors have been trained in this radio pedagogy (Radio ECCA, 2022).

In addition to radio tutoring, Cabo Verde has or has had a number of educational radio options—weekend morning educational radio programming for children, complete with stories and songs; radio lessons; radio broadcasts to support teacher professional development; educational radio dramas (though not in the last few years); and educational radio to help the general population with Portuguese skills or environmental education (Burns et al., 2019).

Radio lessons often borrow techniques from both broadcast radio and IAI and occupy a middle ground between the two. Like broadcast radio, lessons are often largely didactic; though, like IAI, there may be a set of continuous characters with pre-recorded lessons. Typically, the radio "instructor" provides information, asks questions of the learners, and directs the teacher to do certain actions.

However, unlike IAI, which incorporates the teacher into learning, radio lessons often circumvent teachers or include them only marginally. This is in part because many programs are designed to be used for self-study.

### Africa Educational Trust: Somalia, South Sudan, Kenya, Uganda

A well-known model of radio lessons is the Africa Educational Trust (AET). In association with the British Broadcasting Corporation 4 (BBC4), AET offers radio lessons to learners—both teachers and students—in refugee camps in South Sudan, Somalia, Kenya, and Uganda. Where a radio signal is not available, AET distributes the same lessons on CDs and MP3 players. The initiative has focused on helping community volunteers who assume teaching roles to help learners gain basic literacy and numeracy skills. Radio lessons also focus on important daily topics for the community (e.g., cattle raising, issues with alcoholism). AET's program have reached approximately 250,000 Somali learners (Africa Educational Trust, 2014).

In 2013, the new nation of South Sudan adopted English as its official language. AET's *Speak Up II* was introduced to help community volunteer teachers learn English so they could teach it to students. Via teacher surveys and interviews, almost all volunteer teachers and learners credited the program with improving their English and rated the quality of programming as "excellent" (Carfax Projects, 2019, p. 28). However, community volunteer teachers reported that radio broadcasts were not enough in terms of learning how to teach. AET thus provided more site-based support, helped volunteer teachers develop lesson plans, simplified the monitoring process, and created clear success criteria to measure the volunteer teachers' performance. According to volunteer teachers' self-reported data, these modifications appeared to increase their confidence levels and resulted in more learner talk and less teacher talk in learning centers (Carfax Projects, 2019). These findings echo aforementioned research regarding IAI—that audio programing works best when integrated into a comprehensive package of teacher professional development and support (Anzalone & Bosch, 2005; Education Development Center, 2014; Evans & Pier, 2008; Richmond et al., 2021). This is a lesson that is highly relevant for all forms of distance education.

## 2.3 Other Forms of Audio-based Distance Education

Audio-based distance education is extraordinarily diverse. This section examines other models that while not explicitly used for teacher education, certainly could be.

### 2.3.1 Internet-based Audio Lessons

As noted previously, a good deal of audio-based instruction has shifted to the Internet as Internet radio listening increases at a rapid rate (Social, 2022). In particular, formerly on-air media broadcast services stations (such as Radio France Internationale [RFI], the British Broadcasting Corporation [BBC], Rádio e Televisão de Portugal [RTP], and Radio DeutscheWelle [DW]) are continually evolving their on-air services and programs for the Internet.

Some of these offerings are extensions of traditional broadcasting, such as conventional radio or television stations with websites that feature streaming of audio or video programs (i.e., webcasting). Others are unique to the Internet, such as Internet-only broadcast stations. Particularly in Sub-Saharan Africa, where French, English, and Portuguese are still spoken as national languages, these national media broadcasters have developed extensive online platforms with significant educational content to promote language and cultural education. One example is TV5 Monde's *Apprendre le français*, which provides free French lessons linked to the Common European Framework of Reference that defines various levels of proficiency thus allowing learners' progress to be measured at each stage. Many of these audio-based offerings—podcasts, interviews, language lessons—surpass what is offered via airwaves alone as well as what is offered on commercial foreign-language instruction websites.

#### Audio Lessons in the Canarias: Radio ECCA

In addition to Cabo Verde (discussed in Figure 2.4), the Canarias (Canary Islands), another set of volcanic islands off the northwest coast of Africa and an autonomous community of Spain, have made extensive use of audio-based learning in the form of audio-based lessons for continuing education for adults in general and for young people who have dropped out of school. This archipelago-wide initiative, Radio ECCA, offers hundreds of audio-based courses via the Internet, CDs, or broadcast over the airwaves. It is geared toward all adult learners, including teachers.

Radio ECCA's approach consists of (1) materials required to follow the course; (2) detailed recorded lessons—typically 30 minutes in length, in which the learner follows along using paper or digital learning materials; and (3) tutoring—this can be phone-, email-, text- or online-based tutoring between teachers, individual learners, and peer groups. Courses are free—there is an extensive searchable Spanish-language database—however, there is a small cost to receive continuing credit. Upon passing courses, students receive credits that can be applied toward their *bachillerato*, the post-16 stage of education in Spain, comparable to A Levels in the United Kingdom.[6] Radio ECCA's model has been exported to a number of Latin American countries and even to Ukrainian refugees (Radio ECCA, 2022).

Internet-based radio can make radio more available across geographic boundaries for anyone who has Internet connectivity and access to a smart phone, tablet, or computer. Where infrastructure is available and stable, Internet-based radio can circumvent some of the transmission issues associated with community and short-wave radio: It is easier and less expensive to produce and broadcast and doesn't require licensing. This makes possible multiple types of non-formal programming that might not exist without it. However, Internet-based radio also makes it easier for governments to block sites of broadcasters with which they disagree or whose content they disapprove.

### 2.3.2 Soap Operas/Radio Dramas

The popularity and broad ownership of radio makes it a powerful tool for information and social change, particularly in countries and communities with strong traditions of oral literacy.

One form of radio broadcast—soap operas, novelas, or radio dramas—has been employed successfully in other sectors, such as public health and agriculture, to reduce high-risk behaviors and promote positive ones. Such approaches have enjoyed success. A 2011 United States Agency for International Development (USAID) study of radio listenership in 27 Sub-Saharan African countries reported that radio broadcasts appear to be more effective than television as a conduit of information about knowledge, attitudes, and behaviors associated with HIV/AIDS (Westoff et al., 2011).

The "edutainment" value associated with radio novelas, their proven persuasive ability to influence behavior, and their capacity to diffuse information in a social and engaging way, would suggest that radio novelas are worth exploring in some capacity as one of a number of formal teacher learning tools. Radio dramas have been used on a limited basis in education—most well-known might be the defunct *Silk Road Radio*, which ran regularly from 1998–2006 and focused on urban and rural youth in Tajikistan, Uzbekistan, and Kyrgyzstan (The Natural Resource Management Network, 2006). As with serialized television programming, discussed in the next chapter, the educational and entertainment value of radio is noted here as a possible, though unexamined, form of teacher professional development.

### 2.3.3 Podcasts

The Internet and mobile technologies are transforming all forms of audio-based learning. One of the most popular innovations in audio-based open and distance learning for teachers is the use of podcasting. Podcasts are a *series* of audio files distributed over the Internet by syndicated download through RSS Web feeds to phones, tablets, and laptops.[7] Though the same content also may be made available by direct download or streaming, a podcast differs from other digital media formats in its ability to be syndicated, subscribed to, and downloaded automatically when updated content is added. (Podcasts will be referenced again in *Chapter 5: Online Learning*).

There is no shortage of teacher podcasts from which to choose. The Australian Council for Educational Research (ACER) *Teacher Magazine; Two Mister Ps in a Pod(cast); the Educational Podcast Network; Teach Me a Lesson; The Ten-Minute Teacher;* and *The Cult of Pedagogy* all are

[6] After taking the *Bachillerato*, a student may enter vocational training (Higher-level Training Cycles, *Ciclos Formativos de Grado Superior*) or take the *Selectividad* tests for admission to university.

[7] Podcasts are typically a form of social media. Social media will be discussed in *Chapter 5: Online Learning.*

popular podcasts that offer practical teaching ideas. Teachers receive content automatically on phones or computers through RSS feeds, listen through audio services such as *SoundCloud*, *Spotify*, *Apple*, or Google *Podcasts*, or tune in as desired.

Though the focus was not educators, *per se*, one research study at a U.S. university examined the potential effects of podcasts via two treatment arms: Both sets of university students received print handouts of the lecture, but one group also received podcast lectures. Exam scores revealed that this latter group of "podcast students" scored 9% higher on examinations than did non-podcast students, but only if they took notes on the handouts. Podcast students who did not take notes scored the same as the non-podcast students (McKinney et al., 2009).

Studies with pre-service teacher candidates suggest that content acquisition podcasts (CAPs) can provide pre-service teachers with content knowledge (for example, related to language and disability) while other studies have pointed to improved English-language acquisition (Ting, 2014), improved ability to teach ambiguous and complex information, such as language usage and disability, for preservice teachers (McNamara et al., 2020). Cross (2016) suggests enhancing podcasts' effectiveness as a teacher education tool by providing learner-specific guidance related to podcast choice, goal setting, task selection, structured listening activities, and keeping a reflection journal.

Podcasts are increasingly easy to create with free and low-cost tools such as *Wavepad*, *ScreenCastify*, *Audacity*, *Garageband*, and even the basic audio recorder found on most phones. Podcasts can be stored for free on sites like *Podomatic* or *SoundCloud*. For those wishing to learn more, the United States public radio broadcaster National Public Radio offers a free, complete guide on how to start a podcast.[8]

### 2.3.4 Audiobooks

Like podcasts, audiobooks have become a valued and popular vehicle for accessing content. For more than a decade, digital audio has grown by double digits annually. In 2021, audio book revenues totaled US$1.67 billion, an increase of 25% from 2020. Nearly 74,000 audiobooks were released in 2021, many of them new titles (Audio Publishers Association, 2022). Like all audio files, they can be accessed via phones, tablets, and laptops.

Audiobooks—books narrated in an audio recording, versus text-based or "talking books"—are commonly used for students in early childhood to secondary-level settings. Their use as a tool as part of teacher education appears scant, however.

Yet as seen with several of the approaches profiled in this chapter, audio-based learning has multiple learning benefits—e.g., improved reading comprehension, improved reading accuracy and fluency, and improved content knowledge—outcomes that, as Chapter 1 posits, are not always true of print- and text-based reading (Best, 2020). Their greatest benefit may rest in their simplicity—the act of being read to—and the pleasure that ensues from a well-read recording of a book that brings otherwise dull information to life. As one fulsome testimonial from an audiobook user notes, audiobooks can "envelop the reader in aural cues—inflection, emphasis, animation, accent, tone—that deepen and illuminate the experience of encountering the author's words" (Jacoby, 2023).

Attributes like these have made audiobooks a popular way to consume information (Jansen, 2019). Daily audiobook listeners spend more time listening to books than to any other form of audio (radio or podcasts), and younger (versus older) adult readers are more enthusiastic consumers of audiobooks (Audio Publishers Association,

[8] See https://www.npr.org/2021/06/22/1009098800/how-to-start-a-podcast-npr-advice

2022; Best, 2020). A 2022 U.S. consumer survey reported that 54% of audiobook listeners are younger than 45 (Audio Publishers Association, 2022). Such demographic data are important for distance education planners: They suggest that pre-service and novice teachers may be more amenable to reading via audiobooks than from print documents. Further, distance education developers can record audiobooks and then use a free service such as *Audiobook Creation Exchange*, where the audiobook can be converted and sold on sites like Amazon's *Audible*,[9] *Spotify*, *iTunes*, and Google or uploaded and accessed for free via *Digitalbook.io*.

Schools don't have to purchase computers; they don't need Internet connectivity; and teachers do not need to learn complex technology skills in order to participate in audio-based professional development

### 2.3.5 Interactive Voice Response

Interactive voice response, or IVR, is an automated telephone system that combines pre-recorded messages or text-to-speech technology with a dual-tone multi-frequency (DTMF) interface to engage callers, allowing them to provide and access information without the presence of a live human being. If the IVR system cannot retrieve the information that the caller is looking for, the programmed menu options can provide assistance in routing callers to the appropriate representative for help (IBM, 2021). By integrating computer and telephony technologies, IVR has been used for "nudges" (to remind learners to do something), for data collection, and to disseminate simple information and content to teachers and learners during COVID-19 pandemic school closures (Burns, 2021; Morris et al., 2021).

IVR is increasingly popular in donor-funded programs in the Global South, and its use continues to expand and evolve. However, the research on its potential effectiveness has not kept up with its implementation.

## 2.4 Considerations: Audio for Distance Education

Audio is a simple technology with which many teachers across the globe are familiar. Schools don't have to purchase computers; they don't need Internet connectivity; and teachers do not need to learn complex technology skills in order to participate in audio-based professional development. Audio-based, oral learning is a culturally familiar modality that doesn't require either the reading and writing skills needed to undertake print-based instruction or the technology skills demanded by online learning—requirements that often prompt teacher attrition in distance education programs.

Like every technology, audio offers both strengths and weaknesses as a distance learning mode for teacher education. These are enumerated below.

### 2.4.1 Benefits of Audio-based Distance Education

Audio-based instruction holds multiple benefits for education in general and for teacher education in particular. Radio broadcasts, IAI, two-way radio, live radio tutoring, and radio lessons can provide information to teachers at scale; deliver the national curriculum to learners and teachers in remote areas; support community volunteer teachers who have little or training in teaching to successfully implement a lesson; provide targeted instruction, support, and tutoring to learners who may struggle with a particular

[9] *Audible* is by far the biggest audio book retailer, with more than 760,000 titles, many of them audio originals (as of January 2023). With a free account users can listen to up to 11,000 titles (Audible.com, 2023).

**Figure 2.5**
**Sustainability at the Teacher Level**

The goal of any innovation and a critical component of scaling innovations is "sustainability." However, successful implementations are often difficult to sustain in the face of competing priorities (Coburn, 2003). Yet, some innovations may persist, as the following example shows.

From 1998–2006, Guinea's Fundamental Quality and Equity Levels project, funded by USAID and implemented by EDC, began as an IAI project with the popular, in-class program, *Sous le Fromager*. The country's FM radio station broadcast each program until the 2004–2005 school year, when the three ministries that oversaw the program were unable to provide funding for its continued broadcast.

But that didn't stop teachers from using the program in class—at least in rural schools visited by the author. Teachers audiotaped radio broadcasts and created and shared vast libraries of the popular audio program. Parents solicited donations to purchase CD players for schools, and entrepreneurial village residents established CD-ROM and cassette player repair shops. *"IRI" continued without the "R" because substitute technologies were affordable and easy to use.*

Some schools were unable to afford the simplest technologies but still continued with IAI lessons. How? Since IAI is not just a technology, but rather an instructional methodology, teachers who had used the programs for years had internalized the interactive teaching practices and could do them even without the technology.

This points to a fundamental characteristic of sustainability—*depth*. Teachers must have deep knowledge about and comfort with the innovation. They must see that it has value for them and their students. Once this happens, depth results in *shifts* in teacher behavior and these shifts can *spread* throughout a school and become an integral part of teacher repertoire, part of the school's instructional culture (Coburn, 2003). When this happens, many teachers will then do their part to sustain the innovation in their own classrooms even when governments and institutions cannot.

topic, skill, or in a certain content area; provide educational experiences to teachers and learners with no connection to the Internet or cellular services; and offer some degree of standardized educational quality where there are no teachers.

In terms of audio-based distance education, it is interactive audio instruction that has been shown to tower above other audio-based approach, improving teacher learning as it improves student learning and helping teachers apply new pedagogical techniques in lessons facilitated by audio (Ho & Thukral, 2009). The benefits of IAI have been extensively documented throughout this chapter; thus, this section enumerates some of the more diffuse and general benefits of audio-based distance education.

### Audio is often the only technology able to provide educational opportunities in the most challenging geographic, geopolitical, and public health environments

Audio-based formats of distance education, such as radio broadcasts, radio lessons, IAI, and two-way audio are able to reach teachers and students in remote geographic regions or areas of conflict, as well as home-bound audiences and refugee and internally displaced communities in ways that other distance technologies cannot.

For example, the Organization of American States InterAmerican Teacher Network (OAS-ITEN) used radio in South America to reach teachers in the vast, remote Amazon regions of Bolivia, Colombia, Ecuador, Perú, and Venezuela. These teachers could not have otherwise participated in professional development (Inksater, 2017).

In the arctic and sub-arctic region of Canada's Northwest Territories—an area of 1.14 million square kilometers and home to 41,000 of Canada's most remote inhabitants, half of whom are the Dene, Inuit, and Metis people—education during COVID-19 was only possible through educational storytelling via local radio stations and print packets (Bates, 2023; Soanes-White, 2022).

Audio-based instruction has been employed in areas where accelerated learning programs are not possible because of conflict, such as in Mali, Somalia, and Nigeria. In the USAID-funded, EDC-run Education Recovery Support Activity (ERSA) in Mali, IAI, in combination with support to facilitators (teachers) and with rich sets of learning materials, provided basic education, life skills, and livelihood training for approximately 2,800 out-of-school youth (OSY) during armed conflict (Education Development Center, 2020).

### Radio has proven to be a low-cost, high-reach mode of distance education

Where radio infrastructure is available,[10] its range is formidable, reaching large numbers of targeted teachers in geographically remote and isolated areas as well as a potential "shadow audience" of caregivers, out-of-school children and youth, and other adults in the community (Morris et al., 2021, p. 10). Further, radio-based programming allows for additional learners at very low marginal costs. All of these factors make audio in general a highly cost-effective technology[11]—this is particularly true when taking into account the learning gains for teachers and students using IAI. The broad reach of audio-based distance programming means that more teachers can be trained, thus reducing the overall instructional unit cost per teacher (Anzalone & Bosch, 2005; Gaible & Burns, 2007). Further, because teachers can listen to radio broadcasts or audio programs during the school day, schools do not need to worry about paying for substitute teachers, paying teachers' travel to workshops, or losing class time for students.

The cost effectiveness of *narrowcast* technologies, such as audio instruction delivered via phones, CDs, and MP3 players, is also well documented (Christina & Louge, 2015; Damani & Mitchell, 2020; Ho & Thukral, 2009; Richmond et al., 2021). IAI has been successfully deployed since the 1970s in many areas of Africa, the Caribbean, Sub-Saharan Africa, Latin America, and Asia—contexts with often limited human and financial resources (Richmond et al., 2021).

However, as will be discussed, while audio is a cost-effective distance education modality, especially compared to television, virtual reality, and other forms of distance learning, it still entails significant capital costs in terms of developing the entire audio-based distance learning system and recurrent costs such as updating, implementation, and maintenance (Damani & Mitchell, 2020).

### Audio is renewable and sustainable at the individual and institutional level

Finally, audio-based learning is both renewable and sustainable, as the vignette from Guinea in Figure 2.5 about IAI illustrates. The technologies used for audio-based learning—radio, MP3 players, mobile phones, CD-ROM players—have proved to be inexpensive, portable, one-to-many technologies that require minimal training to use, are aligned with traditional oral means of imparting information, such as songs and stories, and are popular with teachers and students (Richmond et al., 2021). With IAI in particular,

[10] Many parts of the world where IAI has been a fixture on the teacher professional development landscape (South Asia, Latin America, and sub-Saharan Africa) have well-developed radio and audio production capacity.

[11] Cost-effectiveness answers the questions, "What did this intervention cost per *outcome* delivered? How does that *compare* to other interventions that produce this outcome?" (Walls et al., 2020, p. 7). Cost effectiveness is difficult to establish in education because it requires both cost data and impact data (Walls et al., 2020, p. 7). Further,given the variability of labor, material, and production costs across countries, it is difficult to establish an exact per-teacher expenditure for IAI across countries. Christina & Louge (2015) draw on Adkins' 1999 World Bank Education and Technology Technical Notes volume *Interactive Radio Instruction: Impact, Sustainability, and Future Directions* (pp. 37–50) for cost effectiveness data. They report that the cost effectiveness ratio for IAI (effect per dollar in cost) was .91, versus .54 for textbooks and .08 for traditional teacher training programs (p. 33).

teachers see its value in terms of improved student engagement and learning; they see its value as a tool for their own professional learning and teaching. Because it's part of the school day and what teachers do, teachers can easily integrate it into teaching and assimilate its practices to expand their teaching repertoire.

### 2.4.2 Limitations of Audio-Based Distance Education

Like any technology, many forms of audio- based instruction also have limitations, as discussed below.

**Educational radio broadcasts often lack measures for quality and outcomes**

Educational radio broadcasting for in-service teacher professional development has often been termed "spray and pray"—it can help teachers gain the basics in curriculum, content knowledge, and awareness around new instructional skills, but soon exhausts its capabilities because of its limitations as a largely passive broadcast medium. Because many radio broadcasts for teacher learning have had limited or no monitoring, school-based follow-up, or formative evaluation, many radio broadcast professional development programs spur more questions than answers. For example, what percentage of teachers listens to the broadcasts with any regularity or at all? What percentage implements with fidelity what has been taught via broadcasts? (Morris et al., 2021).

**Audio-based instruction is more effective when there is interactivity and support**

Data over the decades has shown that teachers are more likely to complete their course of audio-based studies, such as radio broadcasts, when there is support, monitoring, and coaching (Perraton, 1993). This is true for other forms of audio-based instruction such as IAI, where data from the Democratic Republic of Congo and Zanzibar show that teacher support, in addition to ongoing professional development, can improve practice (Education Development Center, 2009; Morris et al., 2015).

> The technologies used for audio-based learning—radio, MP3 players, mobile phones, CD-ROM players—have proved to be inexpensive, portable, one-to-many technologies that require minimal training to use … and are popular with teachers and students.

**Audio, and radio in particular, is viewed as an outdated technology**

Audio may be seen as an unattractive technology by youth despite what appears to be a constant practice of listening to phone-based audio via headsets. Trucano (2010, as cited in Damani & Mitchell, 2020), has singled out this view as a political barrier to the adoption of educational radio. The author too has witnessed multiple cases of Ministries of Education—despite having strong radio infrastructure and weak Internet infrastructure—rejecting IAI or radio lessons as "old" in favor of online learning. Audio-based instruction among many Ministry of Education officials across the globe is often viewed as not modern and fit only for the poorest contexts.

**Like any technology, audio-based instruction depends on strong design**

For teachers to move beyond basic skills in instruction toward more intermediate or advanced skills, other types of audio-based professional development have proven more successful. Indeed, reviews of research on audio-based instruction indicate that those that are most effective are also the most interactive, such as interactive audio instruction (Damani & Mitchell, 2020).

Poorly designed audio programs can still promote watered-down instruction. There are numerous audio-based programs that call themselves "interactive" and claim to be "learner-centered," but such claims are often debatable. Some of this results from poor design. Some results from a failure to completely understand the concept of learner-centered instruction (See *Chapter 10: Instruction*.). Though students may be more *physically* active in some IAI programming, if it is not grounded in clear concepts of learner-centered instruction, the scripted nature of IAI programming diminishes teacher and learner agency and perpetuates the same didactic dynamic of passive teaching and learning (Burns, 2006).

### Audio-based distance education has high initial development costs

Though cost-effective in terms of adding new learners at low marginal costs like any technology-based distance education system, audio-based distance education programs are expensive to build. This is particularly true in terms of radio broadcasts. Exact costs are often hard to determine, for a variety of reasons (labor, cost of inputs, insurance, and other indirect costs), but Christina & Louge (2015) note that major audio-based distance education costs vary according to the technology used. These involve the following:

- Radio—Broadcast costs; costs of radios for users; electricity (solar power or crank-charged), or battery-charging costs
- MP3 or CD—Costs of playback devices and of digital media recording and distribution; electricity or battery-charging costs
- Mobile phones—Costs of mobile phones and of Secure Digital (SD) card recording and distribution; battery charging costs
- Costs of mobile phones and of toll-free line—User costs of interactive voice response is not funded by the government or telecoms; battery-charging costs

Technology is just one cost associated with audio-based instruction. There are multiple other costs, such as scriptwriting, content development, recording episodes, and distribution costs. However, there are avenues for free editable content developed for educational radio. For example, Rising Academies, which originally developed audio content for Sierra Leone and Liberia, makes its ready-to-air radio scripts freely available. All content is licensed under Creative Commons Attribution-NonCommercial 4.0 International license (see Figure 12.6 in *Chapter 12: Developing Content*). Example topics include literacy, language arts, numeracy, and mathematics from preschool through to secondary school. Teacher professional development content also is provided, and all scripts can be edited and localized (Rising Academies, 2021).

### Radio is dependent upon infrastructure

Where radio broadcasts, radio lessons, and IRI are used, they depend upon government or private radio transmission for their dissemination to schools. When that is lacking, all programming may be halted—though as Figure 2.5 illustrates, there are exceptions to this. As Figure 2.5 also shows, radio, like any broadcast medium, is vulnerable to political, economic, and infrastructural forces beyond the control of distance education entities. Community and rural radio may not always have strong signals; broadcast times may bypass students in the morning or afternoon shifts of school; and windup radios may easily break.

Using other audio formats such as CDs or audio programs on phones or MP3 players circumvents these issues.

## 2.5 Summary of Audio-based Distance Education

Audio will be discussed again in *Chapter 12: Developing Content*. Figure 2.6 summarizes the role of audio-based distance learning and its strengths and limitations as a distance education mode.

**Figure 2.6**
**Summary of Audio-based Distance Education**

| Roles in Teacher Professional Development | Strengths | Limitations |
|---|---|---|
| • IAI and radio lessons can substitute for or complements the in-class teacher as an instructor.<br>• Radio and IRI are used to reach large student and teacher populations.<br>• IAI provides a highly scaffolded form of professional development for teachers.<br>• Audio is often targeted toward teachers with weak literacy, content, or pedagogical skills.<br>• Audio-based distance education offers instruction in basic skills, e.g., math, health, language of instruction (English, French, Portuguese).<br>• IAI is used to promote teacher development, primarily via demonstration, guided and hands-on classroom management, and building subject knowledge. | • Radio is a known quantity in all countries, and radio production skills are widespread.<br>• Demonstrable improvements in students' and teachers' learning.<br>• Lack of literacy skills is not a barrier.<br>• It can combine hands-on development of teacher skills with student learning.<br>• It enables instructional continuity across grades and subjects.<br>• It is durable and can survive extreme environments and long-term use with minimal care.<br>• It requires only moderate classroom infrastructure and low technical support.<br>• It can largely facilitate portable and "anytime, anyplace" learning.<br>• IAI as a teacher education tool is supported by a growing body of rigorous research.<br>• Audio-based learning can add new learners at marginal costs. | • The value of content may degrade over time—long-running programs must evolve with schools and education systems.<br>• Broadcast radio often reinforces rote learning models—interactivity may be limited, and attention to needs of individual learners is limited.<br>• Audio may promote a linear, one-size-fits-all approach.<br>• With IRI/broadcast radio, issues such as scheduling, budget, receptivity, or reaching rural regions can interrupt or stop broadcasts.<br>• Hardware replacement programs are necessary: Radios, CD-ROM players, and batteries may be stolen or damaged; windup radios may be fragile.<br>• In some contexts, FM broadcasts have weak signals and short-wave broadcasts are susceptible to solar interference.<br>• Government-funded radio and IRI broadcasts may be interrupted or cancelled for political or financial issues. |

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## References


Africa Educational Trust. (2014). *Radio education*. https://africaeducationaltrust.org/radio-education/

Anzalone, S., & Bosch, A. (2005). *Improving educational quality through interactive radio instruction: A toolkit for policy makers and planners*. World Bank. https://documents.worldbank.org/en/publication/documents-reports/documentdetail/288791468035958279/improv

Audible. (2023). *Audible.* Audible.com: https://www.audible.com/mk/2book

Audio Publishers Association. (2022, June 7). *Audiobook publishers report tenth straight year of double-digit growth* [Press release]. https://www.infodocket.com/2022/06/06/audiobook-publishers-association-reports-tenth-straight-year-of-double-digit-growth-revenue-up-25-in-2021-to-1-6-billion-74000-audiobooks-published/

Australian Government. (2011, August 9). *Schools of the air*. Wayback Machine.

Bates, T. (2023, January 4). *Access to digital learning in Canada's Northwest Territories*. Online Learning and Distance Education Resources. https://www.tonybates.ca/2023/01/04/access-to-digital-learning-in-canadas-northwest-territories/

Best, E. (2020). *Audiobooks and literacy: A rapid review of the literature*. National Literacy Trust. https://files.eric.ed.gov/fulltext/ED607775.pdf

Bhutan Broadcasting Service. BBS. (2022). http://www.bbs.bt/news/

Bonnet, G. (2005). *What do recent evaluations tell us about the state of teachers in Sub-Saharan Africa? Background paper prepared for the education for all global monitoring report 2008 Education for all by 2015: Will we make it?* UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000155511

Burns, M. (2006, February). *Improving teaching quality in Guinea with interactive radio instruction* [Working paper 2]. InfoDev | World Bank. https://documents1.worldbank.org/curated/en/762911468281358815text/466210NWP0Box31Radio0Instruction111.txt

Burns, M. (2020, April 7). *From analogue to digital: School goes online—Part 1*. eLearning Industry. https://elearningindustry.com/analogue-digital-school-goes-online-learning-in-the-us

Burns, M. (2021). *Background paper prepared for the 2023 global education monitoring report, Technology and education: Technology in education*. United Nations Educational, Scientific and Cultural Organization. https://learningportal.iiep.unesco.org/en/library/background-paper-prepared-for-the-2023-global-education-monitoring-report-technology-and

Burns, M., Santally, M., Halkhoree, R., Roopesh Sungkur, K., Juggurnath, B., & Banoor Rajabalee, Y. (2019, November). *ICTs in secondary education in Sub-Saharan Africa: Policies, practices, trends and recommendations*. MasterCard Foundation: Secondary Education in Africa: Preparing Youth for the Future of Work: https://mastercardfdn.org/wp-content/uploads/2019/11/ICT-in-Secondary-Education.pdf

Carfax Projects. (2019). *Evaluation of Africa Educational Trust's speak up II in South Sudan June – August 2019*. Africa Educational Trust. https://africaeducationaltrust.org/wp-content/uploads/2014/10/Speak-Up-II-Final-Evaluation.pdf

Catalano, A. (2018). *Measurements in distance education: A compendium of instruments, scales, and measures for evaluationg online learning*. Routledge.

Christina, R., & Louge, N. (2015). *Expanding access to early childhood development using interactive audio instruction*. The World Bank Group. https://documents1.worldbank.org/curated/ru/743571468204574547/pdf/940100REVISED000ELP0WB0EDC0Feb02015.pdf

Cobo, C., Hawkins, R., & Rovner, H. (2020, March 31). *How countries across Latin America use technology during COVID-19-driven school closures*. World Bank Blogs. https://blogs.worldbank.org/education/how-countries-across-latin-america-use-technology-during-covid19-driven-school-closures

Coburn, C. (2003). Rethinking scale: Moving beyond numbers to deep and lasting change. *Educational Researcher, 32*(6), 3–12. https://doi.org/10.3102/0013189X032006003

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences.* Academic Press.

Conférence des ministres de l'Éducation des États et gouvernements de la Francophonie. (2020). *PASEC 2019 Qualité des systemes éducatifs en Afrique Subsaharienne francophone: Performances et environnement de l'enseignement-apprentissage au primare*. PASEC. https://www.confemen.org/wp-content/uploads/2022/07/Resume_Pasec2019_Web.pdf

Cross, J. (2016). Four Podcasts and autonomous L2 listening: Pedagogical insights and research direction. *European Journal of Applied Linguistics and TEFL, 5*(2).

Crump, S., Twyford, K., Anderson, A., Towers, L., & Devlin, L. (2010). Australian Research Council linkage project on interactive distance eLearning: 'Opening our eyes': Project report. *Interactive distance learning for isolated communitie: ARCL project discussion papers 2008–2010*.

Damani, K., & Mitchell, J. (2020). *Radio: Rapid evidence review*. doi:10.5281/zenodo.3948149

Darling-Hammond, L., Burns, D., Campbell, C., Gooodwin, A.L., Hammerness, K., Ling Low, E., McIntyre, A., Sato, M., & Zeichner, K. (2017). *Empowered educators: How high-performing systems shape teaching quality around the world*. National Center on Education and the Economy.

Desimone, L., & Stuckey, D. (2014). Sustaining teacher professional development. In L. Martin, S. Kragler, D. Quatroche, & K. Bauserma (Eds.), *Handbook of professional development in education: Successful models and practices, pre-k–12* (pp. 467-482). Guilford Publications.

Education Development Center. (2009). *STEP/ATEC Madagascar final report: Volume I. Prepared for the United States Agency for International Development*. Education Development Center.

Education Development Center. (2012). *Tikwere final report cooperative agreement #690-A-OO-07-00020-0 May 2007 to September 2012*. United States Agency for International Development. https://pdf.usaid.gov/pdf_docs/pdacw069.pdf

Education Development Center. (2014). *When teachers understand what they're doing, Students learn: Evidence from EDC's reading program in the Democratic Republic of the Congo*.

Education Development Center. (2020). *Education recovery support activity final report 7/22/2015 to 7/31/2020*.

Education International. (2007). *Teacher supply, recruitment and retention in six anglophone Sub-Saharan African countries*.

Evans, N., & Pier, D. (2008). *Interactive radio usage and its impact on grade 1 and 2 teachers and students: Midterm study of the Appui Technique aux Éducateurs et Communautés (ATEC) Program, Madagascar*. Education Development Center.

Fowler, B. (1987). Aussat and all that! Reaching the Australian outback. *Australian Journal of Educational Technology, 3*(2), 119–128.

Gaible, E., & Burns, M. (2007). *Using technology to train teachers: Appropriate uses of ICT for teacher professional development in developing countries*. InfoDev | World Bank. https://documents1.worldbank.org/curated/en/900291468324835987/pdf/396180infoDev01IN0TEACHERS01PUBLIC1.pdf

Giorgi, R. P., & Christmann, P. (2009). *Étude sur la formation, la gestion, l'affectation et le redéploiement des enseignants du cycle fondamental au Mali 2009. [Study of the Training, Managment, Appointment and Redeployment of Teachers for the Basic Stage of Ed*. ICPE.

Gutierrez, M., & Wurie, M. (2021). *Sierra Leone's radio teaching programme: Challenges and opportunities*. World Bank.

Hanemann, U. (Ed.). (2018). *Aprendizaje a Distancia para Adultos: Radio ECCA, Cabo Verde*. UNESCO Institite for Lifelong Learning. https://preprod.uil.unesco.org/es/caso-de-estudio/effective-practices-database-litbase-0/aprendizaje-distancia-adultos-radio-ecca-cabo

Ho, J., & Thukral, H. (2009). *Tuned in to student success: Assessing the impact of interactive radio instruction for the hardest to reach*. Education Development Center. https://www.edc.org/tuned-student-success-assessing-impact-iri

IBM. (2021, March 15). *Interactive voice response.* IBM: https://www.ibm.com/cloud/learn/interactive-voice-response

Inksater, K. (2017). *Evaluation of the project 'strengthening teachers' skills to meet the needs of 21st century learners: Phase 2.* Organization of American States.

Jacoby, J. (2023, January 8). *Audiobooks are glorious.* Boston Globe: https://www.bostonglobe.com/2023/01/08/opinion/audiobooks-are-glorious/

Jansen, A. (2019). Increasing leisure reading among university students using e-readers with audio. *College & Research Libraries, 80*(3). https://doi.org/10.5860/crl.80.3.356

Lauwerier, T., & Akkari, A. (2015). *Les enseignants et la qualité de l'éducation de base en Afrique subsaharienne. Recherche et prospective en éducation [Réflexions Thématiques, N° 11]*. UNESCO.

Leigh, S. (1995). *Changing times in South Africa: Remodeling interactive learning. LearnTech case study 8*. Education Development Center and United States Agency for International Development.

McKinney, D., Dyck, J., & Luber, E. (2009). iTunes university and the classroom: Can podcasts replace professors? *Computers & Education, 52*(3), 617–623. https://www.sciencedirect.com/science/article/abs/pii/S036013150800167X

McNamara, S., Wilson, K., & Petersen, A. (2020, March 10). Content acquisition podcasts' impact on preservice teachers' understanding of language and disability. *British Journal of Educational Technology*. doi:https://doi.org/10.1111/bjet.12927

Ministry of Education and Vocational Training, Zanzibar and Radio Instruction to Strengthen Education (RISE). (2009). *Radio instruction to strengthen education in Zanzibar: Learning gains assessment.* Education Development Center.

Morris, E., & et al. (2015). *Radio instruction to strengthen education and Zanzibar teacher upgrading by radio: Post project evaluation in Zanzibar.* Education Development Center.

Morris, E., Farrell, A., & Venetis, E. (2021, January). *A roadmap for for measuring distance learning: A review of evidence and emerging practices.* United States Agency for International Development: https://www.edu-links.org/sites/default/files/media/file/Measuring%20Impact%20and%20Outcomes_Final_01.20.2021-508%20%281%29.pdf

Perraton, H. (Ed.). (1993). *Distance education for teacher training*. Routledge Press.

Potter, C., & Naidoo, G. (2009). Evaluating large-scale interactive radio programmes. *Distance Education, 30*(1), 117–142.

Radio ECCA. (2022). *Va Contigo: Formación oficial personalizada y digital a distancia.* http://www3.radioecca.org/

Richmond, S., Burns, M., Boyle, H., Yasin, K., Christina, R., Cetina, A., & Faizullah, S. (2021). *Handbook for interactive audio instruction planning and implementing radio lessons in Sub-Saharan Africa.* UNESCO: https://unesdoc.unesco.org/ark:/48223/pf0000375330

Rising Academies. (2021). *Rising on air.* https://www.risingacademies.com/rising-onair

Sadiman, A. (Ed.). (1999). *Distance learning for basic education in Indonesia.* Center for Communication Technology for Education and Culture (PUSTEKKOM).

Sims, R. (2003). Promises of interactivity: Aligning learner perceptions and expectations with strategies for flexible and online learning. *Distance Education, 24*(1), 87–104.

Slavin, R. E., Lake, C., Hanley, P., & Thurston, A. (2014). Experimental evaluations of elementary science programs: A best-evidence synthesis. *Journal of Research in Science Teaching, 51*, 870–901. doi:doi:10.1080/10824669.2013.862095

Soanes-White, T. (2022). Defining and exploring broadband connections and education solutions in Canada's North. *Canadian Journal of Learning and Technology, 48*(4). https://cjlt.ca/index.php/cjlt/article/view/28262/20621

Social. (2022). *38 staggering radio listening statistics*. Radio Listening Statistics. https://www.soocial.com/radio-listening-statistics/

The Natural Resource Management Network. (2006, April 5). *Silk road radio*. The Natural Resource Management Network. https://www.comminit.com/natural-resource/content/silk-road-radio

Tilak, J. B. (2009). Basic education and development in sub-Saharan Africa. *Journal of International Cooperation in Education, 12*(1), 5–17.

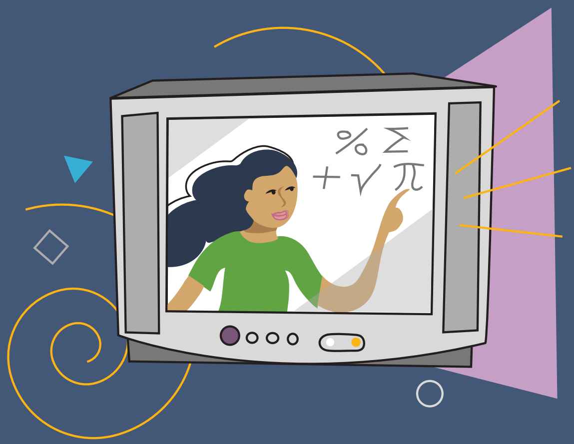
Tilson, T., Jamison, D., Fryer, M., Edgerton, D., Godoy-Kain, P., Imhoof, M., . . . Roy, T. (1991). Sustainability in four interactive radio projects: Bolivia, Honduras, Lesotho and Papua New Guinea. In M. Lockheed, J. Middleton, & G. Nettleton (Eds.), *Educational technology: Sustainable and effective use.* The World Bank Group.

Ting, K. (2014, April 14). Blended learning as a theoretical framework for the application of podcasting. *English Language Teaching, 7*(5). https://files.eric.ed.gov/fulltext/EJ1075759.pdf

United Nations Children's Emergency Fund Latin America and the Caribbean Section. (2020). *Latin America & the Caribbean COVID-19 education response: COVID-19 impact on education in the Latin America & the Caribbean Region (LAC).* https://www.unicef.org/lac/en/media/14241/file

Walls, E., Tulloch, C., & Harris-Van Keuren, C. (2020). *Cost analysis guidance for USAID-funded Education Activities.* United States Agency for International Development. https://www.edu-links.org/sites/default/files/media/file/USAID-Cost-Analysis-Guidance-Final-102921-508.pdf

Westoff, C., Koffman, D., & Moreau, C. (2011). *The impact of television and radio on reproductive behavior and on HIV/AIDS knowledge and behavior. DHS analytical studies No. 24.* ICF International. https://dhsprogram.com/publications/publication-as24-analytical-studies.cfm




Section I. Chapter 3

# VISUALLY-BASED DISTANCE EDUCATION

## Table of Contents

Television and video possess numerous strengths as modes of teacher education.

## 3.1 Overview

Seeing is believing; seeing is understanding; and seeing is learning.

Teachers benefit when they observe other teachers successfully implement an innovation with the same types of learners and the same local context that they themselves face. Seeing other teachers in action offers credibility, whether in person or via television or video.

Television and video possess numerous strengths as modes of teacher education. Like radio, television is a mass communication medium with extensive reach. Both TV and video also are available via the Internet or cellular networks on phones, tablets, and laptops. Television, especially, is a technology with which most teachers are familiar, thus requiring little training, and programs can be recorded and rebroadcast to teachers at their convenience. If informative and engaging, television and video can furnish examples of classroom-based teacher-student interactions, thus enabling teachers to observe the management of learning activities. As this chapter will discuss, visually-based—or, more accurately, audio visually based distance education—is a powerful form of teacher learning, whether transmitted on a disc, via a phone or the Internet, or broadcast over the airwaves. It can help teachers master the content they are supposed to teach but may not know, guide implementation, spark ideas, increase teacher understanding of difficult-to-explain procedures or processes, and model techniques and strategies that are difficult to present in either print or via radio. Like audio, which was discussed in the previous chapter, visually-based learning can do so in just-in-time ways that increase engagement and reduce cognitive load.[1]

This chapter focuses on models of visually-based distance education for teachers. These include analog and digital video and broadcast media such as instructional and educational television—and their potential role in teacher learning. It also includes discussions of forms of television not normally considered as having value for teacher education—closed-circuit television and popular television programming.

## 3.2 Television

Television has tremendous reach and enjoys the advantage of being a familiar and engaging visual medium. Approximately 74% of the world's households have access to television. Though free-to-air digital terrestrial TV (FTA DTT) is still the most common access point, all forms of television viewership continue to grow[2] (Statista, 2022).

[1] See Chapters 1 and 11 for more information on cognitive load.

[2] This is a calculated percentage: number of TV households divided by total number of households. "Television" encompasses numerous options: analog cable TV, digital cable TV, Internet pay TV, pay satellite, free-to-air (FTA) satellite, FTA Digital Terrestrial Television (DTT), pay DTT, analog terrestrial, and pay TV subscriptions (Eutelsat, n.d.).

**Figure 3.1**
**Television During COVID-19 Pandemic School Lockdowns**

Television's might in providing access to education was on full display during the 2020–2021 COVID-19 pandemic school lockdowns. In contrast to online learning, TV's ease of use, reach, and broad array of high-quality digital and analog content made it an educational technology workhorse—providing continuity of learning in a way that online, mobile, or radio-based learning could not. Seventy-five percent of the world's nations—including well off ones like the United States, the United Kingdom, China, and Montenegro—turned to television to provide continuing education to their students (Burns, 2021, p. 86). In far flung corners of the world, where the Internet is less pervasive, as in French overseas territories ("Outre Mer") like French Polynesia, learning was largely delivered via radio and TV (Franceinfo, 2020).

As part of its COVID-19 pandemic-related education strategy, China used educational TV (EduTV) to launch its "Suspending Classroom without Suspending Learning" initiative (Munoz-Najar et al., 2022). Korea's Education Broadcasting System (KEBS) offered TV classes for students and also shared its educational television production expertise with countries needing to establish their own "EduTV" programming quickly (e.g., Vietnam, Cambodia, Paraguay, Uzbekistan, and Lao PDR, among others) (Zacharia, 2020).

Middle-income countries, too, harnessed TV's educational power during emergency remote learning, particularly for students who might potentially struggle with online classes. Morocco and Uzbekistan provided accessible TV classes, such as sign language classes, for children with disabilities (Dreesen et al., 2020). Belize, Ecuador, Brazil, Libya, Croatia, Jordan, the Kyrgyz Republic, and the Czech Republic relied heavily on televised classes—"instructional TV"—in which TV teachers provided direct lectures on a variety of subjects (United Nations Children's Fund Latin America and the Caribbean Section, 2020; ReliefWeb, 2020). Where TV was not ubiquitously available, as in the Maldives, both TV and radio classes were offered to students.

What did TV school look like during COVID school closures? Austria's "TV classes" serve as a template. In the early morning, Austria's national public television broadcaster, Österreichischer Rundfunk 1 (ORF), offered educational programming for preschool and primary school programming. This was followed by three hours of educational programming for middle-school students from 9:00 a.m.–12:00 p.m. This structured programming was supplemented by documentaries, informational segments, and explanatory videos, and students could ask questions via video and SMS (ReliefWeb, 2020).

Television programming and consumption have changed dramatically over the past several decades. A new generation of cloud-supported and software-defined TV means that the "television experience" is less time- and place-based, more platform-varied, personalized, and increasingly a shared social experience as streaming services, Internet Protocol TV, and video sharing sites such as *YouTube* and *Vimeo* have thrived and been integrated with other forms of social media. Some television programs have even been released as an app. Thus, TV and video-based viewing options are increasingly accessible on demand, more differentiated, and also more fragmented.

Once a decades-long staple of distance education, TV for teacher education has waned as it has been replaced by video-based or online learning. That said, countries with high rates of TV ownership, educational television production capabilities, and regions with poor Internet infrastructure may find earlier iterations of television-based distance education and current untapped television programming to be potentially relevant options for teacher education.

## 3.3 TV as School

Despite its historical use as a teacher education tool, the primary audience for television in education has traditionally been *students*—most recently during COVID-19 pandemic school lockdowns, as Figure 3.1 discusses. The following sections examine instructional and educational television for *student* learning and its indirect impact on teachers. The section then pivots to an examination of television geared explicitly toward teacher learning.

### 3.3.1 Instructional Television

*Instructional* television refers to broadcasts that simulate an instructional experience with TV "lessons," where a televised instructor or narrator demonstrates procedures or explains concepts. Often referred to as "EduTV," "television school," "teleschools," or "one-way television," instructional television has traditionally been used to substitute for in-person teachers and ensure educational quality in rural, marginalized areas lacking teachers or qualified teachers (Unwin & McAleese, 1988, as cited in Fabregas, 2019). Countries such as Egypt, Ghana, Turkey, and Pakistan currently use instructional TV—typically satellite-based—to provide direct teaching to students. Some of the most well-established instructional TV programs are India's EduSAT program, México's *Telesecundaría* program,[3] and Brazil's *Meu Professor na Televisão* (My Teacher on TV).[4] Other nations, like South Africa, leverage the Internet to ensure equitable access to learning for disadvantaged communities, often broadcasting instructional television programming directly into classrooms via its *Learning Tube*.[5] Lessons are aligned to the curriculum, shared in small increments (15–30 minutes) throughout the school day, and typically are followed by in-class small-group and individual work, questions and answers, or discussion.

Instructional TV lessons follow the national curriculum, are designed by pedagogical experts, and are typically recorded in a television studio by highly qualified "TV teachers." The TV teacher is traditionally the main teacher or teacher of record; his/her lessons may be live or pre-recorded, and considerable effort is made to ensure high-quality production.

Though more often than not they lack expertise in content or are not formally qualified to teach, in-class teachers—"monitors" or "supervisory teachers"— are a critical component of any instructional television initiative. They support and supervise students in their learning, help students follow the pace of the TV programming, answer students' questions, and grade homework and exams. In many instructional TV initiatives, they are trained to successfully carry out such tasks (Borgheson & Vasey, 2021). They also follow a print-based instructional guide with teaching suggestions for each subject and may lead question-and-answer sessions, engage students in group activities, or assign individual student learning activities.

Not all data on these instructional television models show success. For example, India's EduSAT data show mixed results and, as of this writing, there are no empirical data on Brazil's *My Teacher on TV* (Phalachandra, 2007; Cruz et al., 2016). The most extensive, longitudinal, and rigorous data on instructional TV originate mainly from México, which established its *Telescundarías* (TV secondary schools) in 1968 and has reached millions of students.

Data on instructional TV programs from México suggest that instructional television offers several important benefits. For example, it can:

- increase student test scores in math, science, and language compared to students who attend non-*Telesecundaría* government schools[6] (Beg et al., 2019; Borgheson & Vasey, 2021, p. 4);
- significantly increase school attendance and expand educational access to students who have dropped out of school (Cruz et al., 2016, p. 10; Plata, 2022); and

[3] México's *telesecundaria* model has since been adopted in Guatemala, Honduras, Panamá, El Salvador, Costa Rica, Venezuela, Colombia, and Perú.
[4] This is broadcast in the state of Amazonas, an area larger than France.
[5] This is broadcast via the educational channel of the South Africa Broadcasting Corporation (SABC) and over *YouTube*.
[6] Data from Pakistan and Brazil echo this particular finding.

- improve students' educational attainment and future income earnings (Cruz et al., 2016; Fabregas, 2019, p. 15;[7] Navarro-Sola, 2021, p. 2).

### 3.3.2 Educational Television

The most powerful educational benefits of television are derived from *children's* educational programming. Educational television refers to (primarily) *noncommercial* television content that broadcasts programming for the purposes of educating or enriching viewers' understanding of a particular topic. While it may be used directly in class, educational TV is often accessed in children's homes, typically supplements the formal curriculum, and often is accompanied by other digital and analog media. When directed at younger learners, it often incorporates commercial television design, such as cartoons, animation, music, dance, stories, play, colorful effects, and engaging characters. Many programs, such as the Lao People's Democratic Republic's (Lao PDR) *My House*, for example, include sign language interpretation (Karakaya, 2022).

The U.S.-based Public Broadcasting Service (PBS), the British Broadcasting Corporation (BBC), and the Australian Broadcasting Corporation (ABC) have long produced and transmitted a range of educational programs for the public in general, as well as curriculum-based television directed at young learners. Indeed, three of the longest running TV series across the globe are educational television programs for children—*Sesame Street* (U.S.), *Play School* (Australia), and *Blue Peter* (U.K.).

Globally, popular educational television for children has increasingly taken hold in the Global South, with programs such as Pakistan's *Taleem Ghar*,[8] the aforementioned Lao PDR's *My House*, and Tanzania's *Ubongo Kids* and *Akili and Me* joining long-running international variations of *Sesame Street* (Burns, 2021). The impact of these programs on children's learning has been extensively documented. For example, a synthesis of 24 studies of over 10,000 children in 15 countries,[9] along with randomized controlled trials (RCTs) and quasi-randomized control studies in Tanzania, point to significant positive effects of exposure to children's educational programming such as *Sesame Street*, *Ubongo Kids*, and *Akili and Me* on children's:

- numeracy and literacy abilities (Borzekowski, 2018; Mares & Pan, 2013; Watson, 2019);
- drawing skills, shape knowledge, number recognition, counting, and English skills, often within weeks (Borzekowski, 2018, p. 57); and,
- learning about the world, including health and safety knowledge, and social reasoning and attitudes toward out-groups (Borzekowski, 2018; Mares & Pan, 2013).

### 3.3.3 Benefits for Students. Benefits for Teachers?

Both instructional and educational television have been an educational lifesaver for many students, and an enhancement for others. They provide high-quality—and, in the case of educational TV, multimodal and engaging—instruction, as well as furnishing a degree of educational access and continuity (Wang, 2000). They also have been shown to reduce the effects of teacher absenteeism, a lack of preparation, and limited proficiency in content areas (Fabregas, 2019). Research on México's *telescundarias* show that rural students spend less time unsupervised and more time exposed to educational content in television schools than they most likely would in comparable brick-and-mortar schools (Borgheson & Vasey, 2021, p. 43). Instructional television appears to be most effective when it constantly updates content and ensures rigorous

[7] By way of comparison, in Indonesia, the expansion of primary schools increased years of education for men by an additional 0.19 per school constructed for 1000 children (Duflo, 2001, as cited in Fabregas, 2019).

[8] Developed by the Government of the Pakistani state of Punjab.

[9] These countries included Australia, Bangladesh, Canada, Egypt, India, Indonesia, Israel and Palestine, Kosovo, México, Nigeria, Northern Ireland, South Africa, Tanzania, and Turkey.

mechanisms of control of the quality of learning and of students' assessment (Barros, 2012).

However, the impact of instructional and educational television on *teacher performance* has received far less empirical attention and thus remains unclear. With the exception of Portugal (discussed in the next section), there is almost no explicit evidence documenting the use of student-facing television programs to simultaneously prepare untrained, in-class teachers as they educate students. Hypothetically, if in-class monitors (as in Brazil and México) and untrained teachers (Pakistan and India) paid attention to programming, they should also improve both content knowledge and awareness of teaching strategies. Their access to uniformly high-quality lectures, highly scaffolded teaching support, teaching materials and student learning guides, could ostensibly result in increased teacher confidence and possibly efficacy, particularly in low-resource environments.

Yet none of the effects of instructional TV's four main elements—the TV instructor, the in-class teacher (or monitor), the teaching guide for the in-class teacher, and the reference text (textbook)—has been analyzed separately even where there is research on instructional TV. Nor, apart from some basic professional development for *Telesecundaría* monitors, does there appear to be a concerted or sustained effort to develop the skills of the in-class teacher. The television-related teacher professional development that does exist often appears to be focused on mechanics—teaching teachers how to use the television, follow the in-class teaching guide, and become familiar with program scheduling (Beg et al., 2019; Cruz et al., 2016; Navarro-Sola, 2021; Phalachandra, 2007).

Nonetheless, there is reason to believe greater focus on teacher learning in instructional and educational television initiatives could help address teacher quality issues. First, the examples of interactive audio instruction, Computer Aided Instruction, and virtual classes[10] affirm that efforts that use technology to complement and support teachers tend to have better outcomes than those that use technology to *replace* teachers and that such initiatives can improve teacher learning as they support student learning (Beg et al., 2019; Snilstveit et al., 2015).

Second, evidence-based research on instructional TV from Pakistan's Punjab province points to the importance of engaging existing teachers, even when poorly prepared, with instructional TV.
In one model, students accessed TV lessons via two treatment arms. One group accessed instructional TV and video programming individually and independently via tablets; the other via lessons delivered over a TV screen with some in-class teacher involvement. Students who accessed lessons on tablets experienced decreased math and science scores versus those with television access accompanied by a teacher (Beg et al., 2019). These results confirm findings on educational television suggesting that children can learn more when viewing TV with adults (Linebarger & Walker, 2005, as cited in Peñuel et al., 2009).

Finally, the example of the U.S. Corporation for Public Broadcasting's *Ready to Learn* (RTL) Initiative points to the importance of deliberately building the skills of teachers to augment the learning effects of educational programming. RTL is a multi-year intervention that employs educational television programming in concert with digital media to help preschoolers learn foundational literacy skills— naming letters, recognizing the sounds associated with those letters, and understanding basic concepts about stories and print (Peñuel et al., 2009, p. i).

RTL also provides professional development and coaching for preschool teachers to help them both deliver the curriculum and co-teach *with* the TV programming. This includes helping the

[10] See chapters 2, 4 and 5 of this guide.

teacher learn to: engage children in active viewing of segments and episodes through whole-group and small-group instruction; introduce key skills modelled in the programming; pause the video to encourage active processing and reflection through questioning techniques; and carry out post-viewing activities (Peñuel et al., 2009, p. 5). Research on the impacts of the RTL Initiative attributes its positive effects to integrating the media-rich curriculum with professional development for teachers. In particular, researchers noted that ongoing coaching of the early childhood educators was "critical" to the initiative's success (Peñuel et al., 2009, p. 15).

Thus, given the importance of quality teachers to student learning as discussed in Chapter 8 and given fact that many teachers across the globe often score lower than their students in tests of basic skills (Beg et al., 2019; Bold et al., 2017; United Nations Educational, Scientific and Cultural Organization, Institute for Statistics, 2016), this lack of attention to *teacher learning* in contexts that use instructional and educational television may constitute a missed learning opportunity—for the larger distance education research community, distance educators, and teachers themselves.

The next section turns to television focused explicitly on *teacher* training.

## 3.4 Television-based Teacher Education

For decades, television was a popular mode of teacher training in countries with well-developed broadcasting or satellite infrastructure (e.g., Cuba and the United Kingdom), that cover a large geographical expanse (Canada, Australia, China, México, Brazil, and the United States), and whose large or dense populations make television a cost-effective distance education model for teacher training (India and the United Kingdom). Globally, Canada, China, Indonesia, México, and Brazil all spearheaded the use of television for teacher pre-service and in-service instruction. As a result, teachers in those countries have long participated in television-based professional development in their homes or classrooms, or, in areas where television is not widely available, in viewing centers. While shifts to online learning, the rise of Internet-based TV, and high production costs associated with television have rendered it somewhat anachronistic as a distance education tool for teachers in many parts of the globe, in others it may still play a vital role in teacher education, as shown in the following examples.

### 3.4.1 Instructional Television for Teachers: Portugal

In the 1950s and 1960s, as post-war Europe moved to both rebuild its education system and expand access to secondary education, countries such as France, Great Britain, Portugal, Italy, and Romania experimented with televised schools or "teleschools" (Unwin & McAleese, 1988, as cited in Fabregas, 2019). From 1967–2003, as Portugal expanded access to secondary education, it initiated the use of television schools or *telescolas* with two goals in mind.

The first was to furnish continuing educational access to students in rural and remote regions, standardizing the quality of that access. Though there is limited research on this effort, the program reached 60,000 students annually at its peak, and the majority of students who finished *telescola* had better grades than those from traditional schools (Barros, 2012).

But *telescola's* second larger aim was to create a pipeline for qualified secondary teachers. Each year, approximately 2,500 in-class teachers ("*monitores*") received professional development in content, instruction, and classroom management as well as mentoring from "*ex cathedra*" teachers (TV teachers) in Lisbon as their main path to certification. As *monitores* received more annual professional development annually, they were incrementally granted more in-class responsibilities. This occurred over a number of years under the guidance and supervision of *ex cathedra* teachers until these *monitores* became certified teachers and the teacher of record in the classroom, thus reducing the need for TV teachers. As Portugal expanded its secondary education system and built a cadre of qualified secondary teachers, the number of *telescolas* decreased and the program eventually ended in 2003 (Barros, 2012).

The *telescola* model—structured knowledge transfer and training via technology from expert distance teachers to in-class teachers—has been used in other distance modalities, notably in "virtual classes," which will be discussed in Chapter 5.

### 3.4.2 Teacher-Pre-Service Preparation: China

Perhaps no country has capitalized more on the potential of television for teacher training than China. The country first turned to education as a mechanism to promote economic growth. The 1986 Law on Compulsory Education guaranteed nine years of basic education for all children and catalyzed the demand for more qualified teachers.

The following year China embarked upon a nationwide effort to improve teacher quality at scale. China Television Teachers' College was established in 1987 to upgrade the skills of the two-thirds of China's teaching force who had not received appropriate pre-service teacher training. Within 10 years the number of unqualified primary school teachers declined from 39% to 14%, while the number of unqualified secondary school teachers plummeted from 73% to 36%. Over that decade, 710,000 primary school and 550,000 secondary school teachers received diplomas in education through instructional television (Wang, 2000).

Teacher training via television universities was supplemented until approximately 2010 by 100 instructional television channels operating at both the national and regional levels. Until the last decade, China's TV universities, such as Shanghai Television University and China Central Radio and Television University, were the largest distance education universities in the world. (They have since been transformed into the Shanghai Open University and China Open University, respectively.)

China returned to television teaching during COVID-19 pandemic school closures (See Figure 3.1). To help teachers understand how to use master teaching courseware and conduct online remote teaching more efficiently, professors from Central China Normal University (CCNU) participated in China Educational Television's live TV program "The Same Class: Help Teachers" to help teachers use technology as part of remote learning (Central China Normal University, 2020). The program also was webcast.

### 3.4.3 Providing Pre-Service Teachers with Access to Particular Content: Saudi Arabia

In Saudi Arabian universities, female students (among them pre-service teachers) outnumber male students, but male instructors outnumber female ones (World Bank, 2022). With the exception of two universities,[11] Saudi government regulations prohibit males and females from taking classes together (Effat University, 2022; King Abdullah University of Science and Technology, n.d.). Therefore, a number of Saudi institutions of higher education have capitalized on Closed Circuit Television (CCTV) to enable male instructors to provide classes to female students. The educational use of CCTV in this case involves video cameras, a wireless system, TV screens, transmitters, smart boards, computers, and microphones. A male instructor in one location teaches female pre-service teachers in another remote room in the same university.

[11] Effat University is a female university that admits men, but classes are segregated by gender (Effat University, 2022). King Abdullah University of Science and Technology (KAUST) allows mixed-gender classes (KAUST, n.d.).

Unlike broadcast TV, a CCTV signal is not openly transmitted (Gawi, 2020).

The current research around educational—versus surveillance—use of CCTV is meager, and the limited research that does exist points to fairly uniform poor practices. Instruction tends to be passive—male lecturers talk, female students listen. Nor are lecturers formally prepared in this medium of instruction (Gawi, 2020). This lack of interaction and preparation to teach via technology has been cited as negatively affecting female students' learning. One study suggests that teaching via CCTV could be improved by adding video and *PowerPoints* to lectures (Fathallah, 2007, as cited in Gawi, 2020). Yet, despite its shortcomings, in unique contexts like Saudi Arabia, CCTV is essential to ensuring that female students' have access to higher education.

### 3.4.4 Upgrading Teacher Skills via Instructional TV: Brazil

In Brazil, until the mid-2010s, both private and public television channels used educational programming to improve classroom instruction. *Telecurso*, TV Empresa Brasil de Comunicação's (TV EBC) *Salto para o future*, and Canal Futura's *A-Plus Salto* provided pre- and in-service professional development to approximately 200,000 teachers—though results on their effectiveness are mixed. Programming for *Salto para o futuro* is still archived on TV EBC.[12]

### 3.4.5 TV for Classroom-based Professional Development: The United States

The Public Broadcasting Service (PBS) has long been at the forefront of instructional,[13] as well as educational, television in the U.S. 1987 marked the debut of *French in Action*—a 52-episode French-language immersion program co-produced by Yale University and the PBS station WGBH. The program used a planned immersion approach to language learning—viewers were exposed to authentic French language and culture through a continuing storyline—an American university student abroad in Paris who is befriended by young French woman. The story was embedded with targeted grammar points, vocabulary, and culture, often in a humorous way (Annenberg Learner, 2022).

The actors' spoken language proceeded at a normal pace, but the script was designed to create a logically sequenced approach to teaching the French language. Each storyline concluded with on-air instruction by the series creator, Dr. Pierre Capretz. Because it was so highly structured, *French in Action* served as a curriculum supplement for students, an instructional aid for teachers, and an in-class professional development resource for beginning teachers. The author, a new and nervous French teacher, recorded *French in Action* programs on VHS tapes to improve her own French, used the program as a model for teaching French through role play, and integrated the program into her own classroom instruction. Though there has been no research on teacher learning using this instructional television mode, *French in Action* is still marketed as an aid for both student and teacher learning.

### 3.4.6 Dual Audience Direct Instruction with TV: Namibia

From December 2004 to June 2005, the Discovery Channel's Global Education Partnership Learning Center project provided 371 Namibian schools with a satellite dish, enabling teachers to download prerecorded science, history, and geography satellite TV programs and show them to students in a learning center equipped with a television and DVD player.

Each program was accompanied by a printed teacher's study guide that walked the teacher through the video. The guide included scripts and

[12] See https://tvbrasil.ebc.com.br/saltoparaofuturo
[13] See for example, *Parlons Français*, at https://tinyurl.com/3pbtecyu

pointers for introducing the lesson, told the teacher where to pause the video, offered suggested questions for teachers to ask students, helped the teacher with summarizing techniques, and suggested follow-up activities. Though evaluation data on this program seem to be unavailable, the author observed these classes and interviewed teachers in May, 2005. Teachers reported that they found this form of structured direct instruction helpful. They stated that students were engaged by video-based lessons (the author's classroom observations confirmed this), that the TV programs helped teachers learn how to deliver the curriculum, that that they had learned content they had not previously studied (e.g., hurricanes), and that the printed step-by-step guide structured teaching in a way that gave them confidence.[14]

### 3.4.7 Interactive Television: Scottish Western Islands, Indonesia, South Korea, Australia

Interactive TV (ITV), sometimes referred to as "enhanced TV" or "two-way television," represents the convergence of conventional television with other forms of digital media such as social media or the Internet. It offers learners control over viewing and interacting in virtual educational settings as well as on-demand delivery of content and makes the viewing experience more active than passive.

ITV is not new to distance education. In the 1990s, ITV, or two-way television, was used extensively in rural areas of Australia and the U.S., transmitted from schoolroom to schoolroom, to help pre-service teachers observe teaching behaviors and routines of more experienced teachers. ITV has also traditionally been part of "live telecasts," i.e., university classes transmitted to learners offsite (Gibson & Gibson, 1995). In 2009, Indonesia's *TV Edukasi* began broadcasting 48 hours of weekly programming to pre- and in-service teachers across Indonesia to help them obtain an advanced degree and acquire advanced competencies. The Universitas Terbuka (UT) provided the content and awarded credits to the teachers. Programs were interactive—teachers could phone in and have live on-air, phone-based discussions with the instructor and other viewers.

Interactive TV, transmitted on Interactive Whiteboards and LCD panels, plays a significant role in Scotland's GLOW program, the triple imperative of which is to provide education to remote and sparsely populated Western islands, support the few in-class teachers who remain in those areas, and preserve the Gaelic language (Kizuka, 2019, p. 19; e-sgoil, n.d.).

South Korea capitalized early on the convergence of Internet and television to offer in-service professional development and continuing education to its teachers via Internet Protocol Television (IPTV) providing multimedia content—such as customized data, texts, graphics, video, and audio—high definition audio and video, two-way communication, and the ability for teachers to create playlists of professional development and education-related programming for viewing at their own convenience (Korean Education Research and Information Service, 2009, p. 12).

Interactive television is primarily Internet based, but even traditional analog, two-way television holds benefits for teacher learning. In Australia, a small study of 60 pre-service teachers in rural schools observed teaching, problem solving, and decision-making of other rural teachers via ITV. Teachers and pre-service teachers then discussed planning and activities. Via self-reported data, the 60 pre-service teachers identified four particular benefits of two-way television: the consolidation of theory into practice; the acquisition of valuable insights into teaching in rural, multi-grade classrooms; the unobtrusive nature of the ITV sessions; and the opportunity for immediate

[14] The statements in this paragraph are from the author's research notes from May 2005 classroom observations and interviews with Namibian teachers in schools in Caprivi.

feedback during the interactive discussion (Gibson & Gibson, 1995, p. 224). Today, this same practice could easily be conducted via videoconferencing, but ITV remains a potential option in areas that have better television reception than Internet access. And, as Figure 3.2 outlines, ITV is primarily geared toward children's broadcasting, using communication tools that easily could be adapted into TV and video programming for teacher education.

## 3.5 Serialized Television

As discussed thus far, television has played an overtly educational role in teaching both learners and teachers, but these have been specific types of television—instructional and educational programming. This section examines serialized television as a potential vehicle for teacher education.

### 3.5.1 Popular TV as Teacher?

Though not normally regarded as having educational value (or any value at all), popular TV programming has in fact proved to be a powerful educational vehicle for learning language, adopting certain behaviors, and changing mindsets. Like children's educational programming, popular TV often has educated viewers while simultaneously entertaining them (Burns, 2017).

Serialized programs, with multiple episodes over months or years, appear particularly adept at this. In Bangladesh, the BBC Janala supernatural detective series, *Bishaash*, and accompanying educational gameshow, *Mojay Mojay Shekha* (*Learning with Fun*), were designed to enable millions of TV viewers to learn English. They formed one element of the British and Bangladeshi government's *English in Action* (EIA) initiative, designed to improve the English-language abilities of all Bangladeshis, and the two programs were regularly viewed by 20 million and 18 million people, respectively (Mott MacDonald, n.d.).

**Figure 3.2**
**Learning from Interactive TV for Children**

Distance programs might want to take a page from children's television to make TV- and video-based programming more interactive for *teachers*. There is no shortage of inspiration. For example, a number of children's educational TV programs combine **interactive voice response** (IVR) systems to provide free audio lessons to TV viewers by leveraging radio content repackaged into mini phone-based lessons (Zacharia, 2020). During COVID-19 pandemic school closures, Turkey, Jamaica, and Egypt added multiple **phone help lines and chatbots** to their educational programming to help anxious parents with home schooling (Zacharia, 2020). In India, the local version of *Sesame Street—Galli Galli Sim Sim*—established an IVR system so parents can call a free number for related resources (Zacharia, 2020, p. 46).

The Tanzanian educational program *Akili and Me* employs **text messages** to share reminders and scheduling about upcoming programs, activities for students or for parents and children together, adaptive quizzes regarding the content of their programming, and nudges. An example of the latter might be a text message sent to parents asking rhetorically, "Did you know that if kids watch *Akili and Me* with their parents, they learn better? Tune in at 8 pm to watch together" (Zacharia, 2020, p. 45). As will be discussed in *Chapter 6: Mobile Learning*, "nudges" can be an effective mechanism to promote positive behavior and compliance with norms.

México's version of *Sesame Street—Plaza Sésamo*—displays a ***WhatsApp*** number during broadcasts so parents can request related materials via text that they then can access on their phones (Zacharia, 2020). As will be discussed in chapters 5 and 6, social media and messaging apps are used extensively for teacher learning and could be integrated, formally and informally, into TV- and video-based professional learning for teachers.

In Ireland, proficiency in the Irish language is a prerequisite for university graduation and entry into certain civil service jobs. Yet the linguistic proficiency of teachers of the Irish language is low. To revitalize societal Interest in the Irish language and attract more and better-qualified candidates to teach Irish, the Irish government turned to television in the mid-1990s. *TG Ceathair*, a free-to-air public service television network that also is available online and via an on-demand service TG4 Player in Ireland, has helped to make the language more attractive and accessible to viewers (Ó Ceallaigh & Ní Dhonnabháin, 2015). However, there is no evidence that the channel's popularity has translated into higher caliber Irish-language teachers or instruction in schools.

In Latin America, where *telenovelas* (serialized television dramas or "soap operas") are an institution, they have been credited with improving awareness and involvement in agricultural reform, convincing mothers of the importance of childhood vaccinations, and improving sexual health, adult literacy, and girls' rights, as well as lowering female fertility rates (Hegarty, 2012; Inter-American Development Bank, 2009). In the United States, popular TV programs such as *I Love Lucy*, *Friends*, and *Modern Family* have helped shift attitudes regarding intercultural marriages, responsible adolescent sexual behavior, and same-sex relationships (Collins et al., 2003; Kornhaber, 2015; Tawney, 2019).

### 3.5.2 Changing Behaviors and Mindsets: The Sabido Method

In the 1970s, Miguel Sabido, a TV writer and producer in México and the former director of the Mexican Institute of Communication Studies, developed the "Sabido Method"—an "edutainment" design method, based in part on social learning theory—the premise that humans learn social behaviors by observing and imitating the behaviors of others (Bandura, 1977). The Sabido Method operationalized Bandura's theory for a mass media age, creating programming that aims to "entertain and educate an audience about a particular issue, create favorable attitudes, shift norms, and promote and reinforce behavioral and social change" (Singhal et al., 2004, p. 5).

The Sabido Method has four specific design elements:

- **Education focus.** Entertainment-education soap operas must be designed to educate a very large audience about a particular issue or behavior (for example, educating girls).
- **High production value.** The story, narrative, and entertainment attributes should be of high quality so the program enjoys broad viewership.
- **Strong character development.** "Good" characters are associated with desirable behaviors (e.g., sending girls to school) and "bad" characters are associated with undesirable behaviors (e.g., bullying, sexism, bad teaching).
- **Clear moral message.** Good characters are rewarded and bad characters are punished, so the audience is encouraged to imitate the positive role models (Singhal et al., 2004, p. 5).

The success of Bandura's social learning theory and the Sabido Method in promoting positive beha viors through serialized TV has been successfully disseminated, adapted, and documented across many parts of the globe—lowering female fertility rates in México while increasing enrollment in literacy programs (Hegarty, 2012; Smith, 2002); encouraging women in Niger to use modern contraception methods (Westoff et al., 2011); inculcating greater awareness of AIDS and family planning in Tanzania (Smith, 2002); promoting women's rights in Arab countries (The Economist, 2022); and changing attitudes about female infanticide and child marriage in India (The Economist, 2017). A 2011 USAID-funded study that examined serialized television exposure and female fertility rates in 48 countries in the Global South and reported a positive connection between television exposure and increased contraceptive use in all countries—30 of the studies were statistically significant (Westoff et al., 2011).[15]

These achievements in social mores and public health have not been replicated within education. Though popular films like *To Sir, With Love, Dead Poets Society, Stand and Deliver, Akeelah and the Bee, Goodbye Mr. Chips,* and *Precious* have shown audiences the many facets of a teacher—a mentor, a substitute parent, role model, stickler, coach, advocate, intellect, an inspiration—the use of *television* for specifically educational purposes has been far less common.

This may be beginning to change. Popular television programs whose protagonists are teachers, such as *Der Lehrer* (The Teacher), *Profu* (based on *Der Lehrer*), and *HIT*— German, Romanian, and Spanish TV series, respectively—have been lauded for their realistic portrayals of teaching (La Vanguardia, 2020; Naboya, 2022). *La Otra Mirada* (renamed *The Boarding School* for English-language audiences) is a two-year Spanish TV series that takes place in a girls' boarding school in 1920s Seville. The new, progressive (and mysterious) teacher upsets educational convention when she reconfigures the classroom layout from rows to a U-shape, changes instruction to favor more "critical thinking," and allows students to share ideas. Radiotelevisión Española (RTVE), which broadcast the show, even included a webpage cataloguing the good instructional practices modeled by the show (RTV.es, 2019).

The popular American "mockumentary," *Abbott Elementary* (produced by an ex-teacher), has introduced its viewers to complex challenges that teachers confront daily and has been lauded by teachers for its realistic and humane portrait of the profession (Jacobs, 2022). More specifically, it appears to have taken a page from the Sabido Method, wittingly or unwittingly, as its episodes appear to promote positive mindsets and practices that are critical to good teaching—the importance of collaboration, a "students-first" mentality, creative problem solving, the importance of mentors for young teachers, and the joy of teaching (Bendici, 2022).

Teaching is a much-diminished profession in many countries, with an intimidating global shortage of teachers and a COVID-related exodus from the profession (United Nations Educational, Scientific and Cultural Organization, 2016; Jacobs, 2022). While the above examples of the impact of popular television in changing mindsets are compelling, the ability of such programs to improve attitudes and beliefs toward and about teachers and teaching still remains to be seen.

Although television instruction has largely been replaced by Internet-based technologies, it remains a viable option and a source of useful examples for teacher professional development in contexts with well-developed educational and production infrastructure coupled with areas that suffer from poor Internet access. To be successful, professional development must ultimately change teachers' embedded beliefs. Bearing in mind the caveats of the previous paragraph, no other technology mode can tell a compelling story or provide role models in ways that speak to an audience so intimately, personally, and continuously as television. No other technology has thus far shown its ability to shift mindsets and address some of the most pressing social and behavioral issues as has television (Smith, 2002).[16]

[15] Twenty-eight countries were in Sub-Saharan Africa, 13 in Asia and North Africa, and 7 in Latin America and the Caribbean. Authors report that within Sub-Saharan Africa, unlike other regions of the globe, the covariates of schooling and wealth play an important role in the connection between contraception use and watching television; however, the authors note that while these covariates *diminish* the association between fertility and television exposure, they do *not* eliminate it. Indeed, television viewing "in particular is … strongly associated with the use of modern contraception and with a smaller number of children desired and fewer births… These associations generally persist after adjustment for the amount of schooling, wealth, urban residence, and other covariates" (Westoff et al., 2011, p. xi).

[16] During COVID-19 pandemic school lockdown in 2020 and 2021, a group of Ugandan teachers decided to develop online TV programs for their students. See their efforts here: https://tinyurl.com/3dmzh5vs

## 3.6 Video

If teacher educators were asked to rank their favorite technology tool for teacher learning, it just might be video.

Whether it is used to support students or teachers, video is a powerful professional development tool (Gaudin & Chaliès, 2015). In addition to its lower production costs, video has numerous advantages over TV. It is easy to use. It can localize and contextualize learning as teachers can watch and record colleagues and also observe their own experiments with new instructional methods. And it is versatile. Once confined to hard discs that could be mailed from one location to another, video now can be incorporated into multiple modes of distance learning (as screencasts, MOOCs, online courses, and as teaching segments texted over mobile phones).

### 3.6.1 Video for Teacher Professional Development

There are multiple ways to capitalize on video to deepen teachers' content knowledge and extend teaching practice.

#### Video case studies: *Success at the Core* and *TIMMS Teaching Videos*

Video case studies present teachers with a problem or situation via video (for example, how to differentiate learning in a large classroom) using supporting documentation such as lesson plans and student work and embedding it in analytic discussions. One example of this is *Success at the Core*,[17] a video series designed to help American teachers implement the Common Core curriculum. Each video case includes teachers discussing their design and instructional processes and materials, shares video segments of teaching, and provides discussion and reflection questions (Since *Success at the Core* requires a fee, another potential case study option might be *TeacherTV*,[18] which is free, though no longer updated). These case studies allow teachers to study a classroom or an instructional strategy, such as co-teaching, in depth, modelling how a process should actually be implemented.

Perhaps the most well-known video series is the *Trends in International Mathematics and Science Study* (TIMSS) video study site,[19] which provides videos of math and science classes from around the globe as well as numerous documents about teaching mathematics and science. This site demonstrates the use of video as pedagogical analytical tool for teachers' awareness of students' reasoning (Maher et al., 2014, as cited in Major & Watson, 2018). Use of the above sites could be enhanced through tools such as *Voice Thread* (fee-based) which could facilitate voice- and text-based synchronous and asynchronous discussions around these videos, while free Web-based video annotation tools such as *VideoAnt* could potentially facilitate analysis and rich discussion of these classroom examples. As will be discussed later in *Chapter 9: Teacher Professional Development*, the use of case studies as part of teacher professional development can have considerable and lasting impact on teaching and learning in a teacher's content area (Heller et al., 2012).

#### Analyzing one's own practice: Southeast Asia

Video is not just a window on the practice of other teachers but a mirror of a teacher's own practice, prompting reflection and greater self-awareness in ways that a teacher "might not notice in the midst of carrying out a lesson" (Borko et al., 2008, p. 418).

Over a several-year period, Education Development Center prompted primary school teachers in

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[17] *Success at the Core* was created by Education Development Center and is now available at the *Teaching Channel*. See https://learn.teachingchannel.com/success-at-the-core-sac.

[18] *TeacherTV*, discontinued in 2011, was funded by the Times Education Supplement. From 2005–2011, it provided free video and support materials for British teachers, school leaders, governors, teacher trainers, student teachers, and support staff. One of its aims was to promote professional development. All content is still available to watch or download for free.

[19] See http://timssvideo.com/

Indonesia (2006-2011) and university instructors in Laos, Myanmar, Cambodia, Vietnam, and Thailand (2014–2019) to film their own practice. Using a video analysis protocol, teachers and instructors reflected on their practice in an online learning community or with their coach (Burns, 2019). While data collected on this process was descriptive and self-reported, evidence from experimental research points to higher cognition and motivation among teachers who use video to analyze their own practice (Seidel et al., 2011, as cited in Major & Watson, 2018). There are numerous reliable video self-reflection protocols that teachers can use to help with such self-assessment, such as the evidential reasoning and decision support model (ERDS), as well as Harvard University's Center for Education Policy Research *Best Foot Forward* protocols (Center for Education Policy Research, 2022; Jang, 2019).

#### Modelling standards-based teaching: Australia

In many parts of the Global South, few teachers are trained according to national standards and struggle with the most basic elements of teaching (Bau & Das, 2020; United Nations Educational, Scientific and Cultural Organization, 2016). Even where there are national teaching standards and teachers are prepared according to these standards, it may be difficult to envision what standards-based teaching looks like in practice.

The Australian Institute for Teaching and Learning links Australia's teaching standards with video examples so teachers can see standards-based professional practice as well as access resources to help them attain those standards.[20] The videos serve to visually archive a permanent record of distinct levels of a particular teaching behavior and, by aligning them with performance-level rubrics that make explicit these behaviors, teachers can see stepwise differences in implementation of a particular practice.

## 3.7 Considerations: Television and Video for Distance Education

As the examples above suggest, video holds tremendous potential for teacher training—for teacher self-study, case studies, group study, and to help teachers teach. Video can be made more interactive through interactive online tools, by inserting a slide of discussion questions, or via group activity assignments. Video can be archived and viewed in multiple formats—via the Web, USBs, television, laptops, smart phones, or tablets; on video-hosting sites such as *YouTube*; in online courses and Massive Open Online Courses (MOOCs); through social media, alone or with colleagues, or as part of formal or informal professional learning opportunities.

### 3.7.1 Benefits of Visually-based Distance Education

Television and video are engaging and familiar cultural and professional communication modes with unique features that contribute to teacher learning. These features are catalogued here.

#### Video can let teachers see what is not possible to notice during the act of teaching itself

The above examples show the power of video for teacher learning when supported by "guided noticing," in which teachers intentionally and purposefully watch a video or part of one. Noticing involves identifying what is most salient within the observed teaching situation, drawing on one's contextual knowledge to make inferences about the situation observed, stopping, rewatching, and connecting specific events and broader principles of teaching and learning (van Es & Sherin, 2008, as cited in Hennessy et al., 2016, p. 4).

#### Video can reduce cognitive load

Unlike text, which is highly inefficient, video is efficient and concise—several pages of text can be encapsulated by a brief video segment, and

[20] See here: https://www.aitsl.edu.au/standards

conceptual, abstract information can be made concrete. A video can unfold in a nonlinear fashion, whereas nonlinear text sometimes proves disorienting to the reader (Gaible & Burns, 2007). The use of video, particularly as part of an online or Web-based course, lessens the reliance on print-based learning and thus reduces cognitive load and enhances the accessibility of whatever distance learning model is used to transmit video—television, mobile learning, digital learning games, or Web-based courses (Noetel et al., 2021). (Chapter 1 discusses cognitive load or the way in which limited working memory resources constrain learning processes.)

### Video can support dual channel learning

Because video is a dual-channel (aural and visual) learning approach, as opposed to a single-channel approach such as print or radio, television and video can blend multiple media—still images, moving images, and sound—to offer teachers a more multimodal or multimedia learning experiences than either print or audio alone. This can result in greater long-term retention of information and improved learning (Mayer, 2009).

### Video is a popular tool for self-learning

When teachers need to learn a new skill or instructional approach, more often than not they turn to video. *YouTube* just may be the most popular teacher professional development site in the world. Video lectures and content-based videos, such as those from Khan Academy, can help teachers improve their content knowledge, develop technology skills, or learn how to follow procedures in a stepwise fashion and do so in ways that are often easy to absorb and comprehend.

Such a claim is supported by a substantive body of research. Over 100 randomized trials using video in higher education suggested that, on average, videos led to better learning outcomes compared with other methods and adding videos to existing content showed strong effect sizes. In the 83 studies that swapped existing learning for videos, there were small learning benefits, with meaningful positive effects in approximately half of cases where video was used (Noetel et al., 2021). In addition to its strong effect sizes, video's ability to help learners acquire skills results from its "more authentic perspectives … (it allows) learners to see authentic demonstrations of skills with real people … through the eyes of the performer" (Noetel et al., 2021, p. 19).

### The ability to control viewing confers multiple benefits on learners

Video can generally afford the learner more control over his/her learning. For example, learners can access content at different points in the video as needed; use stop, pause, fast forward, and rewind features to control the pace of learning and information processing, and adapt the presentation pace to their individual needs (Rey et al., 2019). These controls can be manipulated by the learner or designed as part of the video itself in order to highlight meaningful information, segment learning, provide structural cues, or encourage active engagement strategies, such as increased notetaking or "pop-up" quiz questions (Merkt et al., 2022; Noetel et al., 2021). This segmentation and controlled viewing have been shown to improve academic performance, learner autonomy, and self-direction, particularly benefitting learners who encounter complex learning materials, have limited prior knowledge, or exhibit low working memory capacity (Merkt et al., 2022; Rey et al., 2019).

### Video is increasingly easier and more affordable to access, use, and create, thus enhancing its potential as a distance learning option

As they have with audio and print, the World Wide Web and mobile devices have appropriated video, making it more flexible, accessible, and ubiquitous, particularly when used with social media applications such as *TikTok, YouTube, Instagram,* and *WhatsApp*. The video capabilities of many phones have increased—particularly in the case of high-end phones—allowing for easier creation of professional-looking high-resolution video at low cost. During COVID-19 pandemic school closures across the world, governments in Latin America, teachers in refugee camps in Bangladesh, the Education and Training Board in Ireland, and teachers across the globe shared video resources on remote teaching and using technology via *WhatsApp, Facebook,* and *TikTok* (Burns, in press; Cobo et al., 2020).

Additionally, time-shifting technologies such as digital video recorders (DVRs) allow teachers to view television programs at a time of their choosing, while place-shifting technologies such as *Slingbox*, which stream content from home televisions to a tablet, laptop, or phone in another location, allow users to view programs far from home. Online services to compress and stream video, and the increasing ease of creating video for use on computers, phones, and tablets, which can be freely accessed, downloaded, and stored on popular social media sites such as *TikTok* and Instagram or saved in a *YouTube* or teacher online repository playlist, make video an even more attractive and easy professional development option.

Video recurs throughout this guide as part of various practices and distance modes, as seen in particular in Chapters 5, 6, 9, 11, 12, 15, and 16. As part of coaching, for example, 360-degree cameras such as the *Swivl* (or smartphones) can provide a full panoramic view of a teacher's classroom and video-based coaching can help to compensate for the absence of an on-site coach (Chapter 16). Videoconferencing, discussed in Chapter 5, can bring isolated teachers into synchronous conversations with a larger community; this can be enormously beneficial, particularly if a well-trained facilitator ensures productive and focused discussion around the video examples. As further discussed in Chapter 5, face-to-face professional development sessions or lectures at a teacher training college can be recorded in the form of screencasts so student-teachers can review them as needed.

### 3.7.2 Limitations of Visually-based Distance Education

As integral as they are for teacher learning, videos are not a silver bullet and their utility depends on careful attention to purpose, design, sequencing, selection, and use.

#### Video is a technology, not an instructional methodology or curriculum

Videos may suffer from the "If you play it, they will learn" syndrome. Videos are a piece of software, not a methodology, and their intended use, and how they are used, matter. Research suggests that utilization of videos for teacher education works only when teachers view videos with a clear outcome in mind, where clips are purposefully selected to address specific program goals and are embedded within activities that are carefully planned to scaffold teachers' self-reflection and progress toward those goals (Akbari, 2007; Borko et al., 2008; Sherin, 2004). Thus, distance programs must integrate video as part of a sequence of online, broadcast-based or in-person instructional activities.

Nor is video a curriculum. It is a tool that must be carefully conceptualized, designed, and integrated into active and reflective learning in specific purposeful ways (Borko et al., 2008, 419; Burns, 2019). Video design matters. Poorly sequenced information in videos can induce extraneous cognitive load and can negatively impact learning (Merkt et al., 2022). As emphasized in *Chapter 11: Instructional Design*, no amount of learner control can compensate for poorly designed and produced videos (Noetel et al., 2021) and no amount of video can compensate for poorly designed professional learning.

Teachers need to see models of intended practice (both live and video-based), but more importantly they need time and support to analyze, design, and implement these same types of environments. Video can help with some of this. But skilled professionals, sufficient time, and in-class supports will help even more.

### Television has formidable entry barriers

Television has extremely high initial production costs, recurrent costs, demands an extensive distribution network with highly skilled personnel, and requires robust bandwidth, especially for streaming and Internet-based TV. Broadcasts can be interrupted for any number of reasons, whether electrical, technical, programming, or political. Broadcast schedules may not be convenient for teachers, though this is increasingly less a problem given streaming services, Web archiving, internal and external recording devices, and Internet-based TV.

### Much instructional television and video fails to capitalize on the visual medium

Design and production matter with all distance technologies. Because of their visual nature, quality design and production may matter more with TV and video. Yet it often is difficult to create engaging instructional television or video programming.

A good deal of educational video and television is plagued by poor design—talking heads, highly didactic in nature, overly long, of mediocre quality, or low resolution. As Noetel et al. (2021) discovered, passive video viewing has been shown to be "less effective than active engagement (e.g., taking notes)…constructive processing (e.g., generating a concept map) and…co-construction with another learner" (p. 4).

As distance learning tools, the weaknesses of television and video can be redressed by means of the following techniques:

- Using many of the same techniques as used in IAI—pausing, questioning the audience, providing reinforcement, and guiding and scaffolding the teacher
- Viewing videos with a clear purpose in mind, and developing structured protocols and reflection tools so teachers focus on that purpose
- Monitoring teachers' viewing of in-class educational programming and participation in instructional programming through classroom observations, teacher logs, or teacher-created artifacts or activities that directly link to television or video programming
- Using additional communication technologies such as email, two-way audio, mobile phones (text or voice), and IVR to create interactivity between viewers and presenters, between viewers and content, or among groups of viewers in separate locations (See Figure 3.2).
- Where robust Internet connectivity allows, housing video on the Web where it can be "remixed" and where viewers can comment and ask questions (similar to the communities that form in *Facebook*, *YouTube*, or *Vimeo*)
- Developing instructional video—narrated short video segments, interspersed with places for facilitated group discussions, individual reflection, large-group processing, and assignments
- Generating more rigorous research supporting the relevance of video as a teacher education tool

## 3.8 Summary of Visually-based Distance Education

Figure 3.3 summarizes the role of visually based distance learning and its strengths and limitations as a distance education mode.

**Figure 3.3**
**Summary of Visually-based Distance Education (Adapted from Gaible & Burns, 2007, p. 53)**

| Roles in Teacher Professional Development | Strengths | Limitations |
|---|---|---|
| • Television delivers content and concepts to learners across the curriculum.<br>• Video and television are used to develops teachers' skills and knowledge.<br>• Video and television can provide views of real classroom practices and learning activities.<br>• Video and television provide teachers with learning resources that show distant places and graphical representations of concepts or historical events.<br>• Visual medium could (but typically does not) guide teacher through scripted, hands-on classroom activities.<br>• Video and television visually demonstrate difficult-to-understand concepts such as instructional or assessment strategies, communication strategies, and content-based procedures.<br>• Video and television demonstrate new modes of teaching and learning through views of real classroom activities. | • Video and television are both powerful and familiar.<br>• They can be used to "bring" viewers to the site of events and phenomena.<br>• Observing demonstrations of classroom management and other teaching practices helps teachers implement new techniques effectively.<br>• Television, in particular, can reach large populations of students and teachers.<br>• Television and video can support instructional continuity across grades and subjects.<br>• Recording classes shows teachers their own interactions, habits, and progress toward effective teaching.<br>• Devices are equipped with video-editing software, so video can be produced inexpensively and without a great deal of production expertise.<br>• On-demand TV facilitates TPD at times convenient for teachers.<br>• The Internet, gaming consoles (such as the Wii), Virtual Reality head-mounted displays (HMDs), and apps for smart phones and tablets can extend TV and video's reach and functionality. | • Over time, the technical quality of video and television fades and content may look, sound, feel, and be outdated.<br>• The highly didactic nature of instructional television—the TV teacher essentially standing and delivering instruction—represents a strong disconnect between how information is delivered versus how students and teachers typically consume information.<br>• Television broadcasts may be subject to external political and economic disruptions.<br>• Television has formidable barriers: production costs and skills, access to electricity and robust bandwidth.<br>• Individually or locally produced video may be of such inferior quality that it turns off potential learners.<br>• Increasing evidence shows that declining attention spans mean that teachers "tune out" video that is more than a few minutes in length. |

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## References


Akbari, R. (2007, June). Reflections on reflection: A critical appraisal of reflective practices in L2 teacher education. *System, 35*(2), 192–207. doi:https://doi.org/10.1016/j.system.2006.12.008

Annenberg Learner. (2022). *French in action.* Annenberg Learner/ https://www.learner.org/series/french-in-action/

Bandura, A. (1977). *Social learning theory.* Prentice Hall.

Barros, R. (2012). *Telescola: perspectiva de monitores. Dissertação (Mestrado em Ensino de Matemática).* Faculdade de Ciências e Tecnologia, na Universidade Nova de Lisboa. http://hdl.handle.net/10362/9125

Bau, N., & Das, J. (2020). Teacher value added in a low-income country. *American Economic Journal: Economic Policy, 12*(1), 62–96. doi:10.1257/pol.20170243

Beg, S., Lucas, A., Halim, W., & Saif, U. (2019). *Engaging teachers with technology increased achievement, Bypassing teachers did not.* NBER Working Paper 25704. http://www.nber.org/papers/w25704

Bendici, R. (2022, September 6). *Abbott elementary: 5 lessons for teachers.* Tech & Learning. https://www.techlearning.com/news/abbott-elementary-5-lessons-for-teachers

Bold, T., Filmer, D., Martin, G., Molina, E., Rockmore, C., Stacy, B., . . . Wane, W. (2017). *What do teachers know and do? Does it matter? Evidence from primary schools in Africa. Background paper to the 2018 world development report.* World Bank. https://documents1.worldbank.org/curated/en/882091485440895147/pdf/WPS7956.pdf

Borgheson, E., & Vasey, G. (2021). *The marginal returns to distance education: Evidence from México's telesecundarias.* https://gabriellevasey.github.io/MarginalReturns_BorghesanVasey.pdf

Borko, H., Jacobs, J., Eiteljorg, E., & Pittman, M. (2008). Video as a tool for fostering productive discussions in mathematics professional development. *Teaching and Teacher Education, 24*(2), 417–436. doi:https://doi.org/10.1016/j.tate.2006.11.012

Borzekowski, D. (2018). A quasi-experiment examining the impact of educational cartoons on Tanzanian children. *Journal of Applied Developmental Psychology, 54*, 53–59. https://www.sciencedirect.com/science/article/abs/pii/S0193397317300850

Burns, M. (2017, March 2). *From Big Bird to cattle barons: Television as teacher.* Global Partnership for Education. Education for All Blog. https://www.globalpartnership.org/blog/big-bird-cattle-barons-television-teacher

Burns, M. (2019, March 26). *Using video for teacher professional development.* Global Partnership for Education: Education for All Blog. https://www.globalpartnership.org/blog/using-video-teacher-professional-development

Burns, M. (2021). *Background paper prepared for the 2023 global education monitoring report, technology and education: Technology in education.* United Nations Educational, Scientific and Cultural Organization. https://learningportal.iiep.unesco.org/en/library/background-paper-prepared-for-the-2023-global-education-monitoring-report-technology-and

Burns, M. (in press). *Barriers and supports for technology integration: Views from teachers. Background chapter prepared for the global education monitoring report: Technology and education.* United Nations Educational, Scientific and Cultural Organization.

Center for Education Policy Research. (2022). *Best foot forward: Video observation toolkit.* Center for Education Policy Research Harvard University: https://cepr.harvard.edu/video-observation-toolkit

Central China Normal University. (2020, April 19). *CCNU's online teaching guidance and training work reported by China Educational Television.*

Cobo, C., Hawkins, R., & Rovner, H. (2020, March 31). *How countries across Latin America use technology during COVID-19-driven school closures.* World Bank Blogs. https://blogs.worldbank.org/education/how-countries-across-latin-america-use-technology-during-covid19-driven-school-closures

Collins, R., Elliott, M., Berry, S., Kanouse, D., & Hunter, S. (2003). Entertainment television as a healthy sex educator: The impact of condom-efficacy information in an episode of Friends. *Pediatrics, 112*(5), 1115–1121. https://doi.org/10.1542/peds.112.5.1115

Cruz, P., Goulart, F., Kwauk, C., & Perlman Robinson, J. (2016). *Media center innovating with distance learning in Amazonas, Brazil.* Center for Universal Education: Brookings Institute. https://www.brookings.edu/wp-content/uploads/2016/07/FINAL-Media-Center-Case-Study.pdf

Dreesen, T., Akseer, S., Brossard, M., Dewan, G., Giraldo, J., Kamei, A., . . . Ortiz, J. S. (2020). *Promising practices for equitable remote learning: Emerging lessons from COVID-19 education responses in 127 countries. Innocenti Research Brief.* United Nations International Children's Emergency Fund. https://reliefweb.int/sites/reliefweb.int/files/resources/IRB%202020-10.pdf

Effat University. (2022). *Admissions for male and female students are open in all bachelors and masters program.* Effat University Aspire to Achieve: https://www.effatuniversity.edu.sa/

e-sgoil. (n.d.). *e-sgoil.* e-sgoil. https://www.e-sgoil.com/

Eutelsat. (n.d.). *A guide to TV distribution models.* Eutelsat: https://www.eutelsat.com/en/blog/what-are-tv-distribution-models.html

Fabregas, R. (2019). *Broadcasting education: The long-term effects of México's telesecundarias* [Working paper]. Harvard University. https://scholar.harvard.edu/rfabregas/publications/broadcasting-human-capital-long-term-effects-mexicos-telesecundarias

Franceinfo. (2020, April 20). *Continuité pédagogique : les télés et radios vont prendre le relais.* Polynésie 1: https://la1ere.francetvinfo.fr/polynesie/continuite-pedagogique-les-teles-et-radios-vont-prendre-le-relais-823452.html

Gaible, E., & Burns, M. (2007). *Using technology to train teachers: Appropriate uses of ICT for teacher professional development in developing countries.* InfoDev | World Bank. https://documents1.worldbank.org/curated/en/900291468324835987/pdf/396180infoDev01IN0TEACHERS01PUBLIC1.pdf

Gaudin, C., & Chaliès, S. (2015). Video viewing in teacher education and professional development: A literature review. *Educational Research Review, 16,* 41–67. doi:https://doi.org/10.1016/j.edurev.2015.06.001

Gawi, E. (2020). Difficulties of teaching Saudi female students linguistic courses through educational closed-circuit television at Albaha University. *Arab World English Journal Special Edition on CALL*, 6, 394–408. https://dx.doi.org/10.24093/awej/call6.26

Gibson, I., & Gibson, K. (1995). A window into the rural classroom: Interactive television and problem-based activity in Australian pre-service teacher education. *Journal of Information Technology for Teacher Education, 4*(2), 217–226. https://doi.org/10.1080/0962029950040208

Hegarty, S. (2012, April 27). How soap operas changed the world. *British Broadcasting Corporation.* http://bbc.in/1tn1mjJ

Heller, J., Daehler, K., Wong, N., Shinohara, M., & Miratrix, L. (2012). Differential effects of three professional development models on teacher knowledge and student achievement in elementary science. *Journal of Research in Science Teaching, 49*(3), 333–362. https://scholar.harvard.edu/files/lmiratrix/files/differential_effects_of_three_professional_development_models_on_teacher_knowledge_and_student_achievement_in_elementary_science_2012.pdf

Hennessy, S., Haßler, B., & Hofmann, R. (2016). Pedagogic change by Zambian primary school teachers participating in the OER4Schools professional development programme for one year. *Research Papers in Education, 31*(4), 399–427. https://doi.org/10.1080/02671522.2015.1073343

Inter-American Development Bank. (2009, January). *Brazilian soap operas shown to impact social behaviours.* Inter-American Development Bank News. https://www.iadb.org/en/news/brazilian-soap-operas-shown-impact-social-behaviors

Jacobs, J. (2022, February 3). Broken lights, No glue: 'Abbott Elementary' has teachers talking. *New York Times.* https://www.nytimes.com/2022/02/03/arts/television/abbott-elementary-quinta-brunson.html?smid=em-share

Jang, J. (2019). *Reimagining technology preparation for pre-service teachers: Exploring how the use of a video self-analysis instructional component, based on the ERDS model, impacts pre-service teachers' technological pedagogical content knowledge* [Dissertation, Syracuse University]. https://surface.syr.edu/etd/1123

Karakaya, I. (2022, November 9). *Lao PDR: Advancing young children's learning through a TV series.* Global Partnership for Education | Education for All Blog. https://www.globalpartnership.org/blog/lao-pdr-advancing-young-childrens-learning-through-tv-series

King Abdullah University of Science and Technology. (n.d.). *King Abdullah University of Science and Technology.* https://www.kaust.edu.sa/en

Kizuka, M. (2019). Teachers, teacher educators and teacher education in the digital era: Future directions of continuing professional development and the way forward. *Journal of Sustainable Development Education and Research, 3*(1), 15–22. https://doi.org/10.17509/jsder.v3i1.17169

Korean Education Research and Information Service. (2011). *Adapting education to the information age* [White paper]. https://www.keris.or.kr/main/cf/fileDownload.do?fileKey=59781bc0a9a2b35d17dd9ee071a5d074

Kornhaber, S. (2015, June 26). The modern family effect: Pop Culture's role in the gay-marriage revolution. *The Atlantic.* https://www.theatlantic.com/entertainment/archive/2015/06/gay-marriage-legalized-modern-family-pop-culture/397013/

La Vanguardia. (2020, September 16). *RTVE estrena "HIT," serie sobre la educación en España, el 21 de septiembre.* La Vanguardia. https://www.lavanguardia.com/vida/20200916/483515784022/rtve-estrena-hit-serie-sobre-la-educacion-en-espana-el-21-de-septiembre.html

Major, L., & Watson, S. (2018). Using video to support in-service teacher professional development: The state of the field, limitations and possibilities. *Technology, Pedagogy and Education, 27*(1), 49–68. https://doi.org/10.1080/1475939X.2017.1361469

Mares, M.-L., & Pan, Z. (2013). Effects of Sesame Street: A meta-analysis of children's learning in 15 countries. *Journal of Applied Developmental Psychology*. doi:http://dx.doi.org/10.1016/j.appdev.2013.01.001

Mayer, R. (2009). *Multimedia learning* (2nd. ed.). Cambridge University Press.

Merkt, M., Hoppe, A., Bruns, G., Ewerth, R., & Huff, M. (2022). Pushing the button: Why do learners pause online videos? *Computers & Education, 176*(104355). https://doi.org/10.1016/j.compedu.2021.104355

Mott MacDonald. (n.d.). *English in action*, Bangladesh. https://www.mottmac.com/article/2372/english-in-action

Munoz-Najar, A., Sanzana, G., Grace, A., Amer, H., Cobo Romani, J., De Azevedo, J., & Akmal, M. (2022). *Remote learning during COVID-19 : Lessons from today, Principles for tomorrow*. World Bank Group. http://documents.worldbank.org/curated/en/160271637074230077/Remote-Learning-During-COVID-19-Lessons-from-Today-Principles-for-Tomorrow

Naboya, J. (2022, March 15). *The 20 best TV shows about teachers.* TV Show Pilot. https://tvshowpilot.com/fun-posts/best-teacher-tv-shows/

Navarro-Sola, L. (2021). *Secondary schools with televised lessons: The labor market returns of the Mexican Telesecundaria.* Human Capital and Economic Opportunity Global Working Group University of Chicago. https://hceconomics.uchicago.edu/research/working-paper/secondary-schools-televised-lessons-labor-market-returns-mexican

Noetel, M., Griffith, S., Delaney, O., Sanders, T., Parker, P., del Pozo Cruz, B., & Lonsdale , C. (2021). Video Improves learning in higher education: A systematic review. *Review of Educational Research, 91*(2), 204–236. https://doi.org/10.3102/0034654321990713

Ó Ceallaigh, T., & Ní Dhonnabháin, Á. (2015). Reawakening the Irish language through the Irish education system: Challenges and priorities. *International Electronic Journal of Elementary Education, 8*(2), 179–198. https://files.eric.ed.gov/fulltext/EJ1085869.pdf

Peñuel, W., Pasnik, S., Bates, L., Townsend, E., & Hupert, N. (2009). *Pre-school teachers can use a media rich curriculum to prepare low income children for school success: Results of a randomized controlled trial.* Education Development Center and SRI International.

Phalachandra, B. (2007). *Evaluation study of EduSat programme of Chamrajanagar (Karnataka).* Department of State Educational Research and Training Government of Karnataka, India.

Plata, G. (2022). *Educação à distância: O meu professor na televisão.* Inter American Development Bank: https://www.iadb.org/pt/improvinglives/educacao-distancia-meu-professor-na-televisao

ReliefWeb. (2020, April 2). *How countries are using edtech (including online learning, radio, television, texting) to support access to remote learning during the COVID-19 pandemic.* ReliefWeb. https://reliefweb.int/report/austria/how-countries-are-using-edtech-including-online-learning-radio-television-texting

Rey, G., Beege, M., Nebel, S., Wirzberger, M., Schmitt, T., & Schneider, S. (2019). A meta-analysis of the segmenting effect. *Educational Psychology Review, 31*(2), 389–419. https://doi.org/10.1007/s10648-018-9456-4

RTV.es. (2019). *Las enseñanzas de "La otra mirada".* https://www.rtve.es/television/20190715/ensenanzas-otra-mirada/1972240.shtml

Sherin, M. (2004). New perspectives on the role of video in teacher education. In J. Brophy (Ed.), *Advances in research on teaching (Vol. 10): Using video in teacher education* (pp. 1–27). Elsevier.

Singhal, A., Cody, M. J., Rogers, E. M., & Sabido, M. (2004). *Entertainment-education and social change: History, research and practice. (1st ed.).* Lawrence Erlbaum Associates.

Smith, D. (2002, October). The theory heard 'round the world. *Monitor on Psychology, 33*(9), 30–37. https://www.apa.org/monitor/oct02/theory

Snilstveit, B., Stevenson, J., Phillips, D., Vojtkova, M., Gallagher, E., Schmidt, T., . . . Eyers, J. (2015). *Interventions for improving learning outcomes and access to education in low- and middle- income countries: A systematic review, 3ie Systematic Review 24*. International Initiative for Impact Evaluation (3ie). https://www.3ieimpact.org/sites/default/files/2019-01/SR24-education-review_2.pdf

Statista. (2022, July). *Number of TV households worldwide from 2010 to 2026.* Statista. https://www.statista.com/statistics/268695/number-of-tv-households-worldwide/

Tawney, R. (2019, March 22). *Was "I Love Lucy" ahead of its time?* Television Academy. https://www.emmys.com/news/online-originals/was-i-love-lucy-ahead-its-time

The Economist. (2017, January 21). The war on baby girls winds down. https://www.economist.com/international/2017/01/21/the-war-on-baby-girls-winds-down

The Economist. (2022, September 17). I don't: Divorce among Arabs. *The Economist*, p. 46.

United Nations Children's Fund Latin America and the Caribbean Section. (2020). *Latin America & the Caribbean COVID-19 education response: COVID-19 impact on education in the Latin America & the Caribbean Region (LAC).* https://www.unicef.org/lac/en/media/14241/file

United Nations Educational, Scientific and Cultural Organization Institute for Statistics. (2016). *The world needs almost 69 million new teachers to reach the 2030 education goals*. UNESDOC Digital Library. https://unesdoc.unesco.org/ark:/48223/pf0000246124

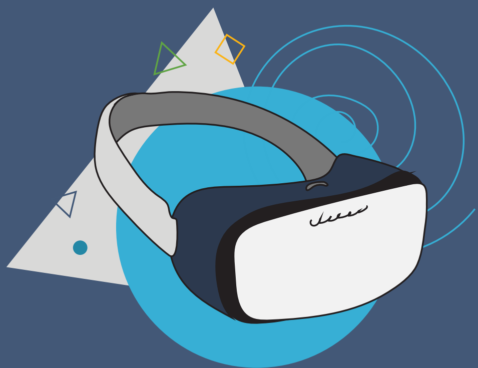
Wang, Y. (2000, March). *Providing teacher training through educational television: The China experience*. USAID's Advancing Basic Education and Literacy (ABEL2) Project. Educational Development Center and the Academy for Educational Development. https://pdf.usaid.gov/pdf_docs/PNACH453.pdf

Watson, J. (2019). *The relationship between educational television and mathematics capability in Tanzania*. University of Cambridge.

Westoff, C., Koffman, D., & Moreau, C. (2011). *The impact of television and radio on reproductive behavior and on HIV/AIDS knowledge and behavior. DHS analytical studies No. 24*. ICF International. https://dhsprogram.com/publications/publication-as24-analytical-studies.cfm

World Bank. (2022, June). *School enrollment, tertiary, female (% gross-Saudi Arabia)*. World Bank. https://data.worldbank.org/indicator/SE.TER.ENRR.FE?end=2020&locations=SA&start=2019

Zacharia, S. (2020, October). *Television education knowledge pack: With a focus on low-resource settings*. World Bank Group. https://documents1.worldbank.org/curated/en/099005104142233123/pdf/P17425205bf126006093970142d904b2c93.pdf



Section I. Chapter 4

# MULTIMEDIA-BASED DISTANCE EDUCATION

## Table of Contents

Multimedia applications, if designed well, offer diverse and school-based professional development opportunities.

## 4.1 Overview

Multimedia is what its name suggests—media that combine multiple formats: text, audio, video, still images, or animations. It can be as simple as a *PowerPoint* with embedded audio and video or as complex as *Minecraft for Education* or virtual reality. It can be accessed online via websites, browsers, and courses (for example, within a learning management system) or offline. Or it can be hybrid—existing both on- and offline.

Multimedia can be professionally created by game and software designers. It can be do-it-yourself—designed by teachers and learners using authoring tools such as *Storyline, Presenter 360, H5P,* or simpler-to-use Web-based tools such as *Canva, Prezi,* or *Slides.*[1] It can be developed by textbook publishers and media providers—Egypt's Knowledge Bank online repository uses content developed by Discovery Education and National Geographic. Or it can be open educational resources repositories such as Creative Commons. Multimedia is used for content, instruction, assessment, and as digital textbooks. Like almost everything technology-related, most multimedia resides on the Internet—in the kind of content repositories that will be discussed in *Chapter 12: Developing Content* and as part of online and blended courses.

This chapter examines various forms of multimedia as modes of both open[2] and distance learning for teacher learning and as supports for teaching. As readers peruse this chapter, they will come to appreciate the heterogeneity of multimedia, its potential for learning, its dynamism, the convergence and shapeshifting of its various forms, and both its integration with and independence from the Internet. In many ways, multimedia, more than any other distance technology, defies attempts to categorize it.

## 4.2 Multimedia Learning

The attraction of multimedia in education rests with the fact that it combines text, audio, video, and animation. As the previous chapter noted, the human brain does not organize multimedia as separate elements of words, images, or text. Rather, it "dual codes" multimedia representations to dynamically produce logical mental constructs. This "multimedia learning" or "multimedia effect," touched upon lightly in Chapter 3, can help both students and teachers learn more effectively and meaningfully because it engages learners in active processing and thus aids learners' working memory (Mayer, 2009).

[1] See, for example, https://multimedia.journalism.berkeley.edu/tutorials/26-useful-tools-for-producing-multimedia-content/

[2] Again, open learning is learning that is flexible and independent.

This dual coding makes for powerful learning. However, not all multimedia is designed with the same intentional focus on learning nor is it evaluated rigorously to ensure positive outcomes for learners. With this caveat in mind, the next section examines an array of multimedia that offer promise as teacher education tools.

## 4.3 Teaching and Learning with Multimedia

In many parts of the globe, where Internet connectivity is unstable and teachers have limited access to technology, multimedia applications have traditionally served as an important vehicle for pre-service and in-service teacher education, for self-study purposes, and as part of formal teacher professional development. For decades, education institutions such as the United Kingdom's Open University used Web-, CD-ROM-, and DVD-based materials for teacher self-study at regional centers. Typically, teachers across the globe access multimedia in one of three ways: (1) via storage devices such as CDs, DVDs, USB drives, and Secure Digital cards (SD cards); (2) via the Internet or a cellular network; or (3) in the form of playlists of multimedia apps and content loaded onto laptops, tablets, and phones, particularly in marginalized and refugee contexts. Paradoxically, however, as multimedia has become a more immersive tool to support teaching and learning processes, its use for *student* learning has increased while its use for *teacher* learning has decreased.

**Figure 4.1**
**Personalized, Individualized, Adaptive Learning**

The terms *personalized learning*, *individualized learning*, and *adaptive learning* are often used interchangeably but are in fact different.

With **personalized learning**, learning goals and instruction *differ* for each learner; thus, the instructor or a computer program may customize instruction for a particular learner. This learning may be self-paced or done as part of a group (Burns, 2021, p. 31). Although thought of as a technology, personalized learning is in fact a type of instruction.

**Individualized learning** refers to a type of instruction that is also paced to the learning needs of different learners. However, it differs from personalized learning in that learning goals are the *same* for all students. They can progress through the material in a self-paced manner, either on or off a computer, according to their learning needs (Burns, 2021, p. 31).

**Adaptive learning** refers to technology that monitors learner progress in a course and uses those data to modify instruction in real time. Adaptive learning programs do this by detecting information, diagnosing it, and enacting new tasks based on this diagnosis. Adaptive learning is not a type of instruction; it is a *technology product*. Many, though not all, personalized learning programs are adaptive (Buckley et al., 2021b; Feldstein, 2013).

### 4.3.1 Computer-Aided Instruction (CAI)

Computer Aided Instruction (CAI) involves computers presenting content-specific skills (math, science, reading) and monitoring the learning that occurs. Although frequently categorized as one type of technology, CAI is highly diverse and may assume a variety of forms, such as tutorials, cognitive (or intelligent) tutoring systems,[3] integrated learning packages, drill-and-practice software, and diagnostic assessments or online lessons that complement non-technology activities (Burns, 2021).[4]

CAI is multimedia-based. It can be as simple as vector animations with audio or as complex as

[3] Although conflated with CAI, Intelligent Tutoring Systems (ITS) are *technically* not the same as CAI for two main reasons. First, while a good deal of CAI is adaptive, not all of it is. ITS is always adaptive (or should be). Second, CAI provides tutoring at the *answer* level while ITS provides feedback at the step level—providing hints, scaffolds, and feedback on every action or step the learner makes in solving a task (DuBoulay, 2016, as cited in Burns, 2021).

[4] Unfortunately, the plethora of variations of CAI make their adequate coverage in this guide impossible.

video-based immersive virtual worlds. CAI has been around for decades, and its earlier iterations were more behaviorist, dichotomous, and focused on individualized learning. However, CAI has become increasingly more multimedia-based, learner-centered, individualized, personalized, and in some cases, adaptive (Figure 4.1 explains these terms). Learners may progress at their own pace and work individually, in a group, or with the assistance of the instructor. The programs generally provide feedback and increasingly adapt the task to the learner's ability, based on student responses to a prompt.

CAI can be *integrative* (used during class along with teacher instruction) or *substitutive* (used as a substitute for teacher instruction). It can be accessed online or offline; in school, at home, or after school; with instructor support or as a self-paced instruction; and, depending on the type of CAI, as a self-directed tool.[5] Depending on the type of computer-aided program, CAI may come with large banks of test items, and depending on the program, CAI can run on desktops, laptops, phones, and, in some cases, on gaming consoles (Burns, 2021).

In a "what's old is new again" motif, CAI—much maligned in the past for its behaviorist and didactic design—has become popular again, in part because the behaviorist and didactic design of many CAI applications can help learners attain basic skills. (Figure 4.2 differentiates between behaviorism and constructivism.) CAI interventions are increasingly common in low-resource environments, and findings on the effectiveness of CAI for student learning in such environments are tantalizing indeed. In three countries—the United States, India, and China—randomized controlled trials (RCTs) and meta-evaluations suggest that *students* using CAI, either in class or after school, show significant learning gains in mathematics, natural sciences, social sciences, and Hindi (Escueta et al., 2020; Kulik, 2003; Mo et al., 2014; Muralidharan et al., 2016). Like instructional television and IAI, CAI may be able to compensate for poor teaching quality or teacher absences and, like audio-based learning and instructional television, CAI works better to *support* teachers rather than to *replace* them (Snilstveit et al., 2015; The Economist, 2021).

**Figure 4.2**
**Behaviorism vs. Constructivism**

*Behaviorism* is a philosophy of learning that emphasizes the importance of behavior, as opposed to consciousness and experience, in learning. Under its original definition by the American psychologist John Watson, the emphasis was exclusively on reflexes and conditioning. In a behaviorist paradigm, learners are environmentally conditioned: The teacher creates a learning environment that elicits a certain behavior and controls learning by predicting and directing learning outcomes. The learner assumes an active role in learning, practicing the new behavior and receiving feedback that reinforces the behavior.

In contrast, *constructivism* is a philosophy of learning that emphasizes learning through experiences and consciousness. Within a constructivist paradigm, learning is a quest for understanding and meaning. The learner actively constructs knowledge by interacting with a variety of experiences, resources, and individuals. The role of the teacher is significantly different than in a behaviorist paradigm. In a constructivist paradigm, the teacher designs learning experiences that promote inquiry, exploration, and problem solving. The teacher is then a facilitator, who guides and supports learners as they construct knowledge.

These philosophies of learning shape instructional design and in turn the ways in which teachers teach and students learn.

[5] The terms *self-paced learning* and *self-directed learning* are often used interchangeably. Although there is some overlap, they are different. In *self-paced learning*, learners proceed from one topic to the next at their own speed or pace. In *self-directed learning*, learners choose to initiate their own learning. They diagnose their own needs, formulate learning goals, implement learning strategies, and evaluate their own efforts and outcomes (Knowles, 1975). While this learning may be self-paced, that is not always the case.

### CAI: Helping teachers learn

CAI is used in other fields for adult learning, especially as part of corporate training. It also has been used over decades for teachers' training, particularly as part of computer-aided language learning (CALL) (Krashen, 2014; Meihami & Esfandiari, 2021). For decades, CAI was a foundational technology in Asia's open universities. For example, both Bangladesh's Open University and the Allama Iqbal Open University of Pakistan deployed CAI as part of pre- and in-service teacher instruction. However, its more contemporary use for teacher education seems to have diminished.

The difficulty of finding contemporary research on the effects of CAI on teacher learning forces a return to earlier research. Data from the 1980s and 1990s, when CAI was more commonly used as part of teacher training, suggest a number of benefits for pre-service teachers. CAI can improve their basic and intermediate content skills, as in algebra and second language learning. It meets the diverse needs and characteristics of adult learners by providing opportunities for self-paced individual and group-based learning (Lauzon & Moore, 1989, as cited in McIsaac & Gunawandera, 1996).

In one of the few contemporary studies on CAI for teacher learning, a quasi-experimental study in Turkey assigned 14 pre-service teachers to a computer-based piano teaching program and 14 to a human instructor. After ten lessons, pre- and post- test levels of the experimental and control groups revealed no significant differences in terms of piano skills. However, in the experimental group, where CAI was implemented, learners' "success and the permanence of learning was better and more effective" than that of learners in the control group (Kaleli, 2020, p. 244). This is one small study, however. More evidence-based evaluations measuring the impact of CAI on teacher learning are needed before we can make any real determinations of its efficacy.

CAI in the form of computer-aided language learning (CALL) has been shown to be effective in developing decontextualized linguistic knowledge, and potentially in improving second-language acquisitions skills of adults (Krashen, 2014)—a finding that holds positive implications for teachers. *Duolingo,* the commercial platform-based language teaching program, offers gamified, micro-lessons on the World Wide Web or via an app, to help users learn a second language. Two efficacy studies[6] evaluated the listening and reading proficiency levels of 540 U.S. adults who used *Duolingo* exclusively as their Spanish- or French-language learning tool. While there were a number of factors affecting test results (e.g., variability in learning rates, concern about the ceiling effect of the Spanish test, and age and motivation issues that might affect engagement of beginning and intermediate-level learners), *Duolingo* showed acquisition levels comparable with those of university students at the end of their fourth and seventh semesters, respectively, in French or Spanish (Jiang et al., 2021; Krashen, 2014).

### CAI: Helping teachers teach

CAI has a number of benefits, not least of which is that it can serve as an instructional support in areas where there is no teacher (Banerjee et al., 2007; Tausin & Stannard, 2018). But CAI—especially programs that are *adaptive*—appears to have four direct benefits for teaching.

First, it measures learner progress in a learning task and uses those data to adapt instruction in real time, thus potentially helping teachers better evaluate the learning needs of students and tailor instruction and supports to personalize that instruction (Baron et al., 2018; Mo et al.,

[6] "Efficacy" is a measure of effectiveness. It's the ability of a product, behavior, or intervention to produce the desired results or effects. Efficacy studies measure whether a treatment or intervention works, especially when compared to outcomes in a control group.

2014; Muralidharan et al., 2016; Rivera et al., 2022; Snilstveit et al., 2015).

Second, CAI also can serve as an important teaching support for junior and senior secondary teachers who have large classes and who have a diverse range of learning abilities within those classes. Barrow et al. (2009) found that CAI may increase student achievement in pre-algebra and algebra by at least 0.17 of a standard deviation, on average, with somewhat larger effects for students in larger classes. This suggests that CAI has the potential to significantly enhance student mathematics achievement and that the gains are comparable to those achieved with drastic class size reduction versus any specific change in teacher practice.

Third, CAI can be used to support and facilitate teachers changing practice from direct, whole-group, lecture-based instruction to more diverse instructional practices, such as blending learning. It also can

- free up teachers to work with students who need tutoring, develop students' non-cognitive skills, and promote group learning strategies (Muralidharan et al., 2016);
- help teachers spend more time on creating more personalized and individualized learning opportunities for students; and
- provide enrichment and remediation activities for students who need them.

Finally, CAI might be most useful for teachers who are teaching outside their content areas or who have weak content skills—a recurrent theme in this guide in particular and in education research in general (Bau & Das, 2020; United Nations Educational, Scientific and Cultural Organization Institute for Statistics, 2016). For instance, in Puerto Rico the Technology Application in Mathematics Teaching program (*Aplicación de la Tecnología en la Enseñanza de las Matemáticas*—ATEMA), implemented by the University of Puerto Rico, uses Khan Academy videos to build the content skills of grade 4-8 math teachers and their students. (Rivera et al., 2022).

### 4.3.2 Digital Learning Games

Multimedia programs may be "gamified" by adding motivational elements and mechanics to multimedia that are not necessarily designed to be games—for example, points, badges, or a leaderboard. Or they may be "game-based," where the games themselves are designed to be intrinsically motivational and are used to teach specific objectives (EdSurge, 2013).

It is the latter—digital learning games or digital game-based learning (DGBL)—that can support teaching and learning processes specific to particular learning outcomes. In contrast to simple games—structured forms of play undertaken for fun or, in many cases, for education—digital learning games combine both the characteristics of video games and those of computer-based games (De Freitas, 2006).

Digital learning games typically have three specific educational uses: (1) as *curricular interventions* used in formal classroom settings or in informal contexts but with a specific *curricular focus*; (2) in *non-didactic activities* to engage students in the learning process; or (3) as vehicles to assess student knowledge and skills (Clark et al., 2009, p. 28).

Digital learning games are highly platform-independent. They can be Internet-based or played on mobile devices such as portable gaming systems (e.g., the Wii, Xbox, or PlayStation), or on televisions, computers, iPads, and smart phones. Input can be touch-, joystick-, keyboard-, or motion-based. Cumulatively, digital games can be both off- and online, collaborative (multi-user/multiplayer), or solitary learning tools. Adding to their expansive nature, digital learning games are so varied in their content, structure, dimensions, and focus, that they may best classified as "genres."

Clark et al. (2009, p. 28) classify *all* games as belonging to one of three categories: (1) games of *short duration*, which can be played in a few

**Figure 4.3**
**Genres of Digital Learning Games (Adapted from Lucas & Sherry, 2004, p. 512). Note that many of these will overlap.**

| Genre | Description of This Type of Game |
|---|---|
| **Action/Adventure** | Players participate in an adventure (e.g., *Little Big Planet; Pentiment*) |
| **Alternate reality** | Players find clues and solve puzzles that blur the boundaries between the game and real life (e.g., *World Without Oil; Superstruct*) |
| **Athletics/sports** | Games are based on athletic or sporting events (e-sports) |
| **Content-based** | Players learn general content or specific content topics (e.g., *Walden; Virtuoso*) |
| **Fantasy/role-playing** | Players assume a character role (e.g., *World of Warcraft; Elden Ring*) |
| **Fitness** | Players engage in physical activities (e.g., *Supernatural; Dance Dance Revolution*) |
| **Problem-solving** | Players solve a real-world problem (e.g., *Urgent Evoke; Mortality*) |
| **Quest/mission** | Players complete a task or fulfill a mission to gain rewards (e.g., *Dorfromantik; Mission: ISS: Quest*) |
| **Quiz/trivia** | Games test players' knowledge (e.g., *NatGeo Kids; Worldle*) |
| **Reenactment** | Players become characters living in a certain historical period, dealing with issues of that period (e.g., *The Hajj Trail; Maya Quest*) |
| **Simulation** | Games mimic or simulate real environments and issues associated with that environment (e.g., *Climate Action Simulation; EcoMUVE*) |
| **Strategy** | Games employ strategies and planning skills (e.g., *Hit the Road; Community in Crisis*) |

minutes online or on handheld devices; (2) games of *fixed duration* with a set start and stop time; and (3) games of *ongoing participation*, in which players become members of an ongoing community and which usually occur online. One example of the latter is Massively Multiplayer Online Role-Playing Games (MMORPGs) or Massively Multiplayer Online Games (sometimes called MMOs or MMOGs).

Digital learning games have a decades-long presence in education. For example, American readers of a certain age may remember *The Oregon Trail*, a computer game developed in 1971. In the game, students set out in a covered wagon in the late 1840s from Independence, Missouri, to travel to Oregon's Willamette Valley—a journey of over 2,000 miles. Their expedition involves encounters with nature, wild animals, terrain, weather, Native Americans, and decisions about food, safety, and travel. Still in use today (with its retro graphics), the multi-textured game often supplements instruction or provides a deeper dive into westward expansion. The game also has inspired *The Hajj Trail*, a multimedia game that introduces students to the history of the early modern Ottoman Empire and the Islamic World [circa 1500–1800 CE] through a historical simulation of the Hajj pilgrimage. The game is used in schools in Turkey and Malaysia and involves assuming a role, making choices, and experiencing consequences (The Economist, 2022b; The Hajj Trail, 2022). *Walden*, a free language arts and social studies game developed by the University of Southern California's Innovation Lab, allows students to explore concepts of civil disobedience and self-reliance. It comes with teaching guides, lesson plans, and a *Facebook* group where teachers support one another in game-based learning principles.

### Educational benefits of digital learning games[7]

Digital learning games enable players to approach problems by engaging in activities and scenarios; conceptualize issues by employing culturally or professionally mediated "lenses;" and solve problems by learning to "think like" scientists, historians, or journalists, who employ systematic methods of inquiry and problem framing in order to investigate an issue.

Approximately three decades of empirical research on learning with games points to positive educational benefits of digital-based learning games, as outlined in Figure 4.4.

**Figure 4.4**
**"Engagement"**

*Engagement* is a much revered but ill-defined concept in learning. Part of the difficulty in defining it is its complexity: Engagement has cognitive, motivational, behavioral, social-behavioral, and cognitive-behavioral components. Engaged learners are attentive and interested, show effort and persistence, participate with peers, and use self-regulation and self-directed strategies to complete a task (Pekrun & Linnenbrink-Garcia, 2012).

Well-designed digital games for learning balance a number of important design elements that contribute to engagement—the story of the game, roles of the players, game objectives, feedback, levels, control limits of the player, and reward and punishment mechanisms. All of these are carefully crafted to promote analytical, creative, and design-oriented thinking skills (Bakan & Bakan, 2018).

Learners who engage with such well-designed digital learning games set goals, monitor feedback, become immersed in the activity, pay attention to what is happening, and enjoy the experience—so much so that often they experience a sense of "flow," where they are so engrossed in an activity that time and space disappear (Csikszentmihalyi, 1990; Hanghøj et al., 2018).

### Digital learning games for teacher professional development

As is evident from Figure 4.5, there is a longitudinal body of research on the positive potential of digital learning games for *student* learning; yet very little research exists on games for *teacher* learning. As with instructional television, discussed previously in Chapter 3, this is an unfortunate omission. Given the popularity of games and demographics of gamers, many teachers (particularly younger ones) are undoubtedly gamers, and games have cross-over potential as didactic tools for teachers. Digital learning games may be particularly helpful where teachers lack strong content knowledge and thinking, reasoning, and problem-solving skills—or when they need models and ideas for making learning more creative and interactive.

*Enigma*, for example, is a digital learning game that helps adults who struggle with certain aspects of literacy improve their reading (Southern Methodist University's Simmons School of Education and Human Development, 2022). Games also can help to cultivate important behaviors—persistence, problem solving, and risk taking—that are as important for teachers as they are for students (Gee & Shaffer, 2010). Teachers who use digital learning games as part of teaching report positive outcomes: They are able to address a wider range of objectives, teach core and supplemental content, assess students, and expose students to a wider variety of game genres and digital tools (Takeuchi & Vaala, 2014).

[7] Visit https://www.filamentgames.com/blog/research-roundup-k-12-game-based-learning/ for a host of updated studies on digital learning games.

**Figure 4.5**
**Benefits of Digital Learning Games**

| Claim: Games can | Explanation | Citations |
|---|---|---|
| **improve conceptual understanding associated with a particular domain** | • A number of studies, including meta-analyses, have found positive learning benefits in math, vocabulary, and science knowledge for digital game-based learning in preschool, elementary, and secondary school settings.<br>• The game design itself, the instructional focus, and the use of supplemental materials can combine to improve learning. | Byun & Joung, 2018; Chen et al., 2018; McCarthy et al., 2018 |
| **promote problem-solving skills** | • Many games employ a problem-based methodology. Learners use facts, artifacts, and evidence to identify the problem, generate hypotheses, evaluate alternatives, and make decisions.<br>• In so doing, they develop high-level skills such as analytical thinking, reasoning, decision-making, and problem-solving. | Bakan & Bakan, 2018; Yang, 2012 |
| **help learners attain national content standards** | • Games can provide an instructional and curricular support to teachers, thus helping them teach to national content standards.<br>• Game-based learning can teach and measure many of the same constructs and skills promoted by the Council for Economic Education standards, Next Generation Science Standards, and National Council of Techers of Mathematics Standards (These are all U.S. standards). | Buckley et al., 2021a |
| **by design, be higher-order learning tools** | • Games embody adaptable challenges, clear criteria, personalized feedback, and a broad range of challenging topics as intrinsically motivating ideas.<br>• Games can serve as entry points into conceptually complex content in ways that lead learners to investigate a concept further through immersion in the process.<br>• Games often require players to collaborate and communicate with others, both in online environments and in the physical spaces where gameplay occurs; solve complex problems; modify the game; map out complex variables; and find solutions to challenging "boss" levels.[8] | Gee & Shaffer, 2010; Klopfer et al., 2009; Spires, 2015 |
| **elicit evidence of deeper understanding and cognitive processes** | • Interpretation of streaming data from gameplay or interaction with a carefully designed digital user interface allows researchers to evaluate how people go about solving problems and can lead to more targeted feedback.<br>• Learners develop conceptual thinking by interacting with and manipulating complex systems and alternate, virtual environments in which they outfit themselves with virtual identities or avatars in order to practice ways of knowing within a situated, authentic context. | Buckley et al., 2021a; Chen & Law, 2016; Chung, 2014; De Freitas, 2006; Gee, 2003; Gee & Shaffer, 2010; Yang, 2012 |

[8] Gee and Shaffer (2010) write: "'Boss battles' at the end of a level in a game are often used to assess whether the player has mastered the skills of the level just finished, and whether he or she is prepared for learning the more demanding challenge of the next level" (p. 13).

| Claim: Games can | Explanation | Citations |
|---|---|---|
| **foster collaboration and motivation** | • Collaboration, in addition to scaffolds within digital game-based learning, can significantly positively impact intrinsic motivation.<br>• Collaboration (and competition) may positively impact above-average-students over below-average ones. | Chen & Law, 2016; Ter Vrugte et al., 2015; Yang, 2012 |
| **assess hard-to-measure skills** | • Game-based assessments include rich, scenario-based programs, such as virtual worlds, simulations, and multi-user virtual environments.<br>• They provide students with a developmental sequence of challenges that gradually increase in difficulty so that players are working at their highest abilities.<br>• As learners manipulate complex systems, their instructors can measure difficult-to-assess skills such as higher-level thinking skills and 21st-century skills of persistence, creativity, self-regulation, problem solving, and collaboration, as well as affective states (such as engagement) via the use of eye-tracking and facial recognition software.<br>• Game-based assessments also provide feedback, hints, and just-in-time resources, as well as capturing and storing multiple sources of data over prolonged periods to provide information about the student's work so teachers can tailor tasks and problems to the individual student. | Buckley et al., 2021a,b; Gee & Shaffer, 2010 |
| **improve science, technology, engineering, and mathematics (STEM) knowledge** | • Compared to non-digital game learning activities, digital game-based learning has a moderately significant effect on learners' STEM achievement.<br>• Digital game-based instruction can be more effective than other instructional strategies on learner STEM knowledge, indicating that intervention of digital games seems to improve learning. | Wang et al., 2022 |

Finally, digital learning games also can provide teachers with ideas for nondigital gaming scenarios, content framing, and instructional approaches that they can use in class. Games should be one component, not the sole menu item, of a professional development program. They should also be facilitated by a skilled instructor who can help teachers persist with the game, particularly when it seems disorienting, when it becomes difficult, and when navigation issues become problematic. Skilled facilitators also can help teachers reflect on their own learning via digital learning games; discuss ways to use games to promote students' propositional knowledge and procedural skills; and design experiences that transfer some of the games' engaging digital experiences to the teacher's analog classroom to enhance student learning.

### 4.3.3 Immersive Environments

Digital learning games have rules. This next category of multimedia—immersive environments—have no rules. This can be a strength or a drawback (Wheelock & Merrick, 2021).

"Immersion" is the extent to which a system presents a vivid virtual environment while shutting out physical reality (Cummings & Bailenson, 2016). Thus, as their name suggests, "immersive environments" allow learners to become totally enveloped in a self-contained artificial or simulated environment while experiencing it as real.

**Figure 4.6**
**Examples of Immersive Rooms**

Two well-known educational immersive rooms are the Cave Automated Visualization Environment (CAVE) and EvoRoom.

CAVE is a small surround-screen projection space developed for professional preparation, training, and simulation, in fields such as mining and aviation.

EvoRoom, a simulation of the rainforest ecosystem of Borneo and Sumatra, is designed by Encore Labs as an integrated element within a Grade 11 biology curriculum unit. The environment is hardware intensive. Implemented within a "smart classroom" research environment, the room is equipped with computers, servers, projection displays, and customized software to coordinate the flow of participants, content materials, and data collection.

The smart classroom technology includes a user portal, allowing students to register and log into the room; an intelligent agent framework, allowing custom software "agents" to track real-time interactions among students, peers, and materials; and a central database for curriculum materials and the products of student interactions. In order to support a common, shared experience for students, the room is set up with two sets of large projected displays and two interactive whiteboards.

The interactive whiteboards are located at the front of the room. The simulation files are networked and controlled with a custom tablet application that allows the teacher to manage the time spent in each portion of the activity, thus controlling the pedagogical flow within the room (Lui & Slotta, 2014, p. 64).

This illusion of immersion can be amplified by wearing haptic[9] clothing (gloves or a vest) to simulate the experience of touch. Immersive environments can offer rich and complex content-based learning, while also helping learners hone their technical, creative, and problem-solving skills. Like virtual worlds, with which they are sometimes conflated, immersive environments are increasingly common in education, though more often with students as opposed to their teachers. However, immersive environments are gaining attention as a potentially powerful tool to help teachers transfer learning from the theoretical to the practical (Ledger et al., 2022) and will be examined as such in this chapter.

Immersive environments generally come in the following flavors:

- **Immersive rooms,** which are a dedicated physical space equipped with technology. Audio and visual media are projected on walls, with learners sometimes using three-dimensional (3D) goggles or head mounted displays. In the room itself, learners experience a sense of being "immersed" in a historical, biological, or geographic environment. Because these environments are so rich and visual, users tend to be highly engaged. Figure 4.6 explains immersive rooms in greater detail.
- **Virtual Reality or Augmented Reality "head mounted displays"** (HMDs), such as Oculus Quest2/Meta Quest 2 or Microsoft HoloLens vary in their design, but typically contain a pair of stereoscopic lenses, stereo sound, sensors to track the user's movement and a light emitting diode (LED) display. The HMD, or any type of VR goggles, distorts the image on the screen so the user experiences it as an alternate reality— in 3D versus 2D.
- **Desktop enabled environments** are partially immersive environments[10] that can be accessed via a laptop or desktop computer and, in many cases, via a mobile device.[11] They involve

[9] Haptic technology creates the illusion of touch by applying vibrations or motions that the user experiences as real.

[10] Another example of the numerous contradictions of technology. Though we can argue whether "partially" immersive is truly immersive, it is considered a category of immersive environments, such as virtual reality (See for example, Roundtable Learning, n.d.)

[11] There appears to be a strong consensus in much of the gaming discussion that desktops are better than laptops for graphics-intensive games.

learners in activities that are game-like or represent other worlds. They include many types of games, simulation software, and sites such as, *YouTube VR, Tatsumeeko,* and *Discord*. Though not fully immersive, desktop-enabled environments use icons or features to create at least a partially immersive environment.

As to which is better for learning, a 2020 meta-analysis synthesizing findings from 35 studies comparing immersive VR via head mounted displays to less immersive desktop VR came down on the side of HMDs for improving knowledge acquisition as well as skill development (Wu et al., 2020, as cited in Makransky & Mayer, 2022, p. 10). The analysis did not examine immersive rooms.

There are numerous subcategories of immersive environments. Indeed, the whole taxonomy of immersive environments can be confusing for the layperson—and even for those involved in educational technology. Since immersive environments encompass a number of multimedia and Web-based applications, the term means different things to different people. For example, immersive environments include simulations, virtual worlds, virtual-reality programs, Web-based games, Multi-user Virtual Environments (MUVEs), and Massively Multiplayer Online Games (MMOGs) (Najafi, 2009, as cited in Burns, 2010).

What they all have in common is that they submerge learners in situated, game-like, content-related scenarios, typically in real-world situations that prompt learners to think like or adopt the mindset of some real or assumed role. Experiences can be synchronous or asynchronous, persistent, community-based, and conducted via avatars using networked and non-networked computers (Burns, 2010).

Immersive environments[12] are clearly at the high end of the multimedia continuum. They involve high-end graphics cards and desktops; robust bandwidth; highly audiovisual and 3D design; and a willingness on the part of teachers and learners to suspend belief and participate in an open-ended, alternative, networked experience. These requirements, combined with the frequent need to fit them into the curriculum, mean they are not widely used in teacher training colleges or teacher education departments in universities across the globe (Takeuchi & Vaala, 2014).

Immersive environments can be created in a number of ways, as discussed above, but the real drivers are increasingly Augmented Reality and, to a far greater extent, Virtual Reality.

### Augmented Reality

If you've ever used a *Snapchat* filter, then you have a basic understanding of Augmented Reality (AR). AR is an "immersive" interface that allows a combination of real-world elements captured through a camera with multimedia elements such as text, images, and video. In contrast to Virtual Reality (discussed below), which completely immerses the user in a synthetic world *without* the ability to see the real world, AR enhances or "augments" the environment by superimposing virtual objects and cues onto the physical world, thus enabling learners to interact with—but not manipulate—this three-dimensional augmented environment in real time (Wyss et al., 2021, p. 2). To use AR, learners require a head-mounted display, like Microsoft's HoloLens or Google's AR glasses; an app on a device; and a "trigger"—paper, a photo, a location— that initiates the AR experience and turns 2D content into a 3D experience.[13] AR, like VR, can be part of in-person, blended, online, or mobile learning.

[12] Immersive Education is a nonprofit international collaboration of universities, colleges, research institutes, consortia, and companies working together to define and develop open standards, best practices, platforms, and communities of support for virtual reality and game-based learning systems. See http://immersiveeducation.org/

[13] To see how this works, visit https://www.youtube.com/watch?v=emiGJNa9gwg

AR is steadily making inroads in education across the globe. For example, in South Korea, schools designated as "smart schools" extensively employ AR (Lim & Kye, 2019).[14] *Mondly* is a popular AR-based language learning app used in many countries. Portugal's *EduPARK* initiative creates original, attractive, and effective strategies for interdisciplinary learning in natural sciences, physics, chemistry, mathematics, and history. Its mobile interactive Augmented Reality application allows teachers and learners to participate in exploratory, geocaching activities in outdoor environments (EduPARK, n.d.).

The incorporation of AR into educational practices for effective learning places numerous demands on educators. The first is a change of mindset. As with digital learning games—toward which many educators often express reservations—university pre-service or in-service teacher professional development programs may be reluctant to use or integrate AR into their curriculum (Russo et al., 2021; Wyss et al., 2021). This speaks to the need to provide distance instructors and the teachers they teach with AR tools and train them in methodologies using AR technologies (Marques & Pombo, 2021). More so, it speaks to helping instructors and teacher learners see the pedagogical utility of AR—that its value does not rest solely on the use of the technology, but is driven by how AR is designed, implemented, and integrated into formal and informal learning environments (Wyss et al., 2021, p. 3).

As a potential tool for teacher training, AR is promising. Because it is immersive and highly sensorial, it shifts learning from the informational to the experiential. Chapter 1 discusses the cognitive load teachers face when reading text from a screen. AR, by its highly visual design, reduces that load. Second, Wyss et al. (2021) note that the educational value of AR is not so much its technical features but rather "its pedagogical possibilities and alignment with learning theory" (p. 663). The few studies that exist on AR for teacher education—one from Switzerland and the other from Portugal—suggest that pre-service and in-service teachers are quick to grasp the pedagogical potential of AR (Marques & Pombo, 2021; Wyss et al., 2021).

Finally, a glance at professions beyond education shows how AR alone or in combination with VR—a combination known as "extended reality" or XR—might be deployed in distance education. For instance, AR is used extensively in solar energy installation. A junior electrician on a job site might struggle with the proper installation of solar panel. Alone, with no immediate support, he connects his Head Mounted Display to his laptop for a remote, live, VR-based meeting with his supervisor, a master electrician. The master electrician can use AR applications to point out errors in the installation process. If that doesn't work, she can remotely take over the junior electrician's laptop in real time and, using her AR application, overlay the steps for correct installation on the junior electrician's actual device (S. Ives, personal communication, November 26, 2022).

### Virtual Reality

While Augmented Reality *partially* immerses the user in a virtual world, Virtual Reality (VR) can *fully* immerse the user in a new, digital, all-encompassing simulation of a physical world, often via a head mounted set like Meta Quest 2. While the user may *know* the experience isn't real, it certainly feels real, thus the power of such an experience. Students can participate in virtual field trips of the Acropolis through Google *Arts and Culture*, participate in a tour of the White House guided by a U.S. president, or create a digital 3D model of an animal cell with identifiable organelles using the VR tool *CoSpaces*. Files can be converted to a GLB format and then uploaded and viewed and analyzed via ClassVR

[14] This information is based on the author's 2011 visit to several South Korean smart schools.

headsets. For those schools who have access, the same model could be converted to an STL file to be printed on a 3D printer.

Though VR is generally considered a fully immersive experience, there are in fact three types of VR which vary according to their degree of "immersiveness:"

- **Non-immersive virtual reality** in which the user can interact with the virtual environment through a computer screen, for example a video game, or a simulator. It is considered a virtual reality category because the user can to some extent control the movement of virtual objects on screen.
- **Semi-immersive virtual reality** provides *partial* immersion by overlaying digital components over real-world objects. This type of VR is mainly used for educational and entertainment purposes.
- **Fully immersive virtual reality** provides a 360° sensory simulation for the user to step in and experience (Mattoo, 2022).

This degree of "full" immersion is further categorized according to "degrees of freedom" —that is, the ways an object can move through 3D space.

- **360° degree VR uses three degrees of freedom.** Learners can look left and right, up, and down, pivot left and right, and can interact with the virtual environment via gaze control or a pointer on handsets. But they *cannot* move throughout virtual space.
- **Full VR uses six degrees of freedom.** Learners can move forward and backward, up, and down, and right and left through virtual space. They can observe and interact with objects placed in the virtual environment as they would if those objects were real.

This degrees of freedom distinction has professional development implications— it means teachers will either be stationary or able to move (Roundtable Learning, n.d.)

A long-running joke about VR is that it is the future of education—and always will be. Despite such cynicism, VR has in fact expanded dramatically in education—even beyond the usual educational innovators and early adopters.[15]

Companies like Mursion offer pre-service educator preparation, clinical practice simulations, and practice sessions for adult interactions, such as parent-teacher conferences, via virtual reality (Mursion, 2022). Thus, pre-service teachers learn how to deal with a difficult student or situation before real-life consequences occur. Arizona State University has partnered with Dreamscape, an immersive virtual reality company, to create a nine-module VR simulation of a zoo for learners majoring in biology (Arizona State University, 2020). VRsatility, developed by students at the Harvard Graduate School of Education, provides pre-service teachers with an immersive virtual space to engage in realistic mock simulations to practice high-stakes decision-making scenarios and various instructional strategies before entering the classroom (Bauld, 2019). And Crosswater Digital Media uses VR to "teleport" educators into conflict environments, which could ideally serve as preparation to teach in such environments (Crosswater Digital Media, 2022).

### Virtual worlds

While VR often drives an *individual* learning experience (because of the use of headsets), virtual worlds —a sub-category of VR and a common format for digital gaming—are more social and highly synchronous. Within a virtual world,[16] people are represented as avatars who interact with one another and with 3-D artifacts,

[15] My thanks again to Shane Ives, serious gamer and VR enthusiast, Albuquerque, New Mexico, for letting me use his Oculus headset and tutoring me on the finer points of VR applications.

[16] Virtual worlds are also referred to as Multi-User Virtual Environments (MUVEs).

take part in a range of educational and social experiences, and create their own content. Virtual worlds also can be accessed via headsets, but most are simply accessed via a computer screen. The virtual world contains similarities to the "real" world, such as topography, movement, and physics that provide the illusion of "being there" (Warburton, 2009, p. 418). This has made them a powerful professional education tools for health workers and those in the hospitality and tourism industry, for example—and increasingly, for educators.

Virtual worlds are being accessed increasingly via social virtual reality commercial platforms, such as Microsoft's *AltSpace* VR, or via HMDs. However, many of the most popular virtual worlds in education can still be accessed without HMDs (i.e., "desktop enabled"). These include *Quest Atlantis*, *Whyville*, *Open Sim*, *Sim on a Stick* (a virtual world on a USB drive), *Minecraft for Education*, and *Second Life*. *Minecraft for Education* has, over the years, been integrated into a number of formal education systems. For example, the Welsh Government in 2019 provided every teacher in Wales access to *Minecraft for Education* and established five Minecraft Learning Centers across Wales (Llywodraeth Cymru [Welsh Government], n.d.). The North American Scholastic eSport Federation sponsors annual international e-sport competitions with school teams from the United States and Canada competing against student teams (in 2021 and 2022) from Japan, Israel, Kuwait, Egypt, Jordan, the United Arab Emirates, and Palestinian Territories, in part to promote intercultural understanding and language learning (North American Scholastic eSports Federation, 2022).

And though its popularity has waxed and waned since its inception in the 1990s, *Second Life* has been used extensively for teacher preparation, classroom management, language learning, special education, science, mathematics, educational technology, and parent-teacher engagement (Davis et al., 2022, pp. 3–4; González et al., 2011). Warburton (2009) itemizes the array of educational offerings in *Second Life:* discussions, self-paced tutorials, displays and immersive exhibits, role plays and simulations, data vizualisations and simulations, historical recreations and re-enactments, living and immersive archaeology, treasure hunts and quests, language and cultural immersion, and creative writing (p. 421). *Second Life* may be the best vehicle for understanding the notion of the Metaverse (discussed below).

Given its maturity, the use of *Second Life* for teacher education has been examined in empirical studies, summarized in literature reviews, and its benefits and limitations are well-documented. In their study of *Second Life* as part of teacher pre-service education in Australia, Ledger et al. (2022) reported several advantages:

- It allows pre-service teachers to experience a broader range and depth of practical experiences than would be the case in face-to-face settings.
- The utilization of virtual worlds such as *Second Life* can provide collaborative, reflective, and skill development opportunities of engagement for pre-service teachers.
- It offers opportunities and challenges in facilitating a learning environment that can assist pre-service teachers in developing pedagogies of practice via representations, decomposition, and approximations of practice (Davis et al., 2022, pp. 7–9; Grossman et al., 2009).
- As a participation-based network, *Second Life* may help learners build communities of practice, collaborate with peers in group work, and create and share content.

### The Metaverse

Virtual worlds have a high degree of overlap with the Metaverse—a loose term that describes an immersive, three-dimensional, virtual-reality–driven, extended reality Internet. Think of the Metaverse as a user-built world with social media, accessed via virtual reality headsets, and powered by Artificial Intelligence, cryptocurrencies, blockchain, and non-fungible tokens (NFTs) (Herrman & Browning, 2021). Within the Metaverse, as it is envisioned, users can play games, talk, attend lectures, buy things, and create their own worlds. All of these activities already exist in applications such as *Second Life* and in Massively Multiplayer Online Games, social media, and other virtual worlds; the Metaverse brings them together seamlessly and immersively and allows them to interact with the real world.

The Metaverse, at the time of this guide's publication, was in its very initial stages, so this section simply describes it. The Metaverse may well indeed mark the culmination of computing from the desktop to the pocket "overlaid on our world," as some predict (The Economist, 2022a)—or it may ultimately be much ado about nothing. But if it does what its parent company, Meta, hopes, we can imagine the Metaverse as a future potential tool for teacher professional development.

### Simulations

In contrast to virtual worlds, which involve multiple users, simulation programs tend to involve one user and be more closed and structured. Simulation software is used extensively across numerous professions, such as aviation, to allow individuals to engage in repeated trials involving high-stakes situations without risking the loss of valuable resources (e.g., money, time, and people) (Dieker et al., 2013). Simulations are incrementally becoming more popular as part of pre-service teacher preparation to help future teachers develop effective and equitable approaches in their teaching in a safe space (Davis et al., 2022). This openness toward simulations is in part because of the accumulating research showing that pre-service teachers can gain valuable and meaningful practice in their teaching through engagement in classroom simulations (Childers & Hite, 2022).

One example is *SchoolSims*, developed by the Graduate School of Education at the University of Pennsylvania for pre- and in-service teachers. The application involves teachers interacting with a simulated classroom and engaging in real-life vocational-related scenarios (for example, an angry parent). Learning is achieved, not by arriving at a correct answer, but by enabling users to consider options, make mistakes, and draw conclusions from experience (SchoolSims, 2022). Thus in contrast to virtual worlds, simulations pre-program responses to "complex threads of interactions" between a teacher and simulated students or their simulated parents (Bradley & Kendall, 2015, as cited in Davis et al., 2022).

There are numerous simulation applications for teacher pre- and in-service instruction, including *simSchool*, *Sim:Classroom*, *At-Risk for High School Educators*, *At-Risk for Middle School Educators*, *Step In*, *Speak Up!*, *Cook School District*, *Teacher Simulator*, and *DTkid* (which trains teachers to work with children who have autism).

### Mixed Reality

Mixed reality involves blending and combining physical and virtual environments to produce a unique environment where physical and digital objects interact in real time. This often involves combining the use of computer avatars (digital representations of a person) and actual human beings.[17] Because of this live human element, mixed reality programs have been harnessed to help pre-service teachers prepare for either their school-based practicum or their first classroom upon receiving their degree as the two mixed reality examples below illustrate.

**Mixed reality for coaching.** At the University of Virginia's Curry School of Education and Human Development's Curry School of Education, researchers have tested mixed reality simulations to study the causal effects of coaching on

[17] Just to make it even more confusing, mixed reality in some circles is considered a type of augmented reality (AR). In others it is considered part of the virtual reality continuum, with physical reality at one extreme and immersive virtual reality (VR) at the other.

candidates' perceptions and teaching skills. This involves (1) *computer generated* "students" who behave like unruly teens; (2) the human pre-service teacher who tries to manage her unruly virtual students; and (3) live human coaches who assess the pre-service teacher's classroom management efforts. Researchers randomly assigned the 105 pre-service candidates into one of three treatment arms using the simulator. The effects of these are listed in parentheses.

- Model 1 Coaching Only: This involved a short coaching session after each practice simulation to review and give feedback. (Overall quality treatment effect:[18] 2.55)
- Model 2 VBIE and Coaching: This involved a live "bug in the ear" approach (explained in Chapter 6,) with a coach dispensing advice via the teachers' Bluetooth headpiece during the practice simulation. (Overall quality treatment effect: 2.60)
- Model 3 Self-Reflection Exercise: This followed the simulation to guide the teachers to think about classroom management techniques on their own. (Overall quality treatment effect: 2.60)

There were more treatment effects for different outcomes than those listed above, and all were robust (Cohen et al., 2020, p. 219). Researchers concluded that the mixed reality simulators could improve candidate practice in the simulator in substantial ways, especially when supported by reflection and by "bug in the ear" technology—the latter experienced particularly steep gains. However, the "big empirical question" is whether or not such an approach can result in transfer into real classrooms (Cohen et al., 2020, p. 226).

**Mixed reality for microteaching.** TLE *TeachLivE* is an immersive environment[19] developed by the University of Central Florida that helps pre-service teachers develop a range of skills for teaching students with special needs and various levels of disabilities through practice teaching a classroom full of student avatars. The teacher enters a physical room where everything looks like a classroom, including props, whiteboards, and students. But it is a mixed reality setting with avatars who act like teenagers, depending on the objectives of the experience. Unlike the "students" in the previous mixed reality example from the University of Virginia, these "students" are actually human actors connected via audio or video who speak through the avatars. Thus, the experience is live and spontaneous because actors respond to the teacher as students would (Dieker et al., 2013). There is also another set of human beings—education instructors (humans)—who observe while hidden from the pre-service teacher and who provide feedback.

The teacher candidates interact with virtual students to review previous work, present updated content to students, provide guided practice in a variety of content areas, and monitor students while they work independently or collaboratively. If a teacher performs poorly or if they want to experiment with a new teaching idea while using TLE *TeachLivE*, there is "no adverse effect on any real student, though the experience itself feels real" (Dieker et al., 2013, p. 25).

The program has proved popular with pre-service teachers, since it allows them to make mistakes in a safe environment, receive feedback from their education instructors, and prepare virtually for live interactions with real students. Since its inception in 2005, TLE *TeachLivE* has expanded across the U.S. and is used at pre-service institutions in Australia, Italy, Malaysia, México, Switzerland, and the United Arab Emirates.

However, a synthesis of research on virtual and mixed reality simulations showed mixed results

[18] The average treatment effect is a measure used to compare treatments in randomized experiments. It measures the difference in mean outcomes between units assigned to the treatment and units assigned to the control.

[19] *TeachLivE* is alternatively referred to as a "mixed reality simulation" and a "virtual world"—thereby confirming lack of definitional clarity of technologies, and of immersive environments in particular.

for *TeachLivE*. For example, continued exposure helped pre-service teachers improve teaching self-efficacy, but this improvement dissipated 30 minutes after exposure to the simulations. Coupling this simulation with instructional coaching allowed for increased and individualized remediation for teacher candidates in terms of instruction and classroom management practices (Ade-Ojo et al., 2022, pp. 6–9).

Though simulations, mixed- and virtual-reality–based immersive environments are far less common in education than in other professions, they are becoming more popular and more formalized as educational tools for online, blended, in-person, and mobile learning (Gandolfini, 2018). (Indeed, many VR programs assign point values, give feedback, and are powered by learning analytics.) They possess several potentially powerful features for teacher training.

First, immersive AR and VR-generated environments allow for learning experiences that would otherwise be impossible, impractical, too expensive, or dangerous to do. For example, pre-service teachers studying life sciences can enter a 3D virtual representation of the COVID-19 virus and manipulate and examine spike proteins, or conduct numerous virtual dissections on the human body, or travel through the human digestive system. No other application is so visual, spatial, manipulable, or able to infinitely expand space.

Next, in all of the immersive environments described above, teachers are able to practice with virtual students across a range of ages, cultures, backgrounds, behaviors, and abilities (high- and low-incidence disabilities) prior to encountering real students in physical classrooms (Dieker et al., 2013, p. 29; González et al., 2011). Through an avatar, teachers can experience cognitive processing from the point of view of a student with autism, dyslexia, or a physical disability. Since these worlds are computer generated, the realty, context, and characters can be continuously modified and updated, and levels of ease or difficulty can be adjusted—which is harder to do with human or analog role playing.

Third, pre-service or novice teachers who enter these virtual environments must meet session objectives. If they fail to do so, they can reenter the virtual environments with a new plan and try again to teach the same students the same concept or skill after having received feedback and being given a chance to reflect on their practice. In simulated environments, instruction, and management routines, as well as content, may be repeated with an individual teacher or across several teachers using the same instructional context until the skill or routine is mastered. Thus, they allow pre-service teachers to practice teaching strategies in a virtual world before trying them online, and then practice online before carrying them out with students in a school-based practicum. This minimizes the potential harm that can be inadvertently inflicted by novice teachers learning on the job (Dieker et al., 2013, p. 29).

Fourth, like their students, teachers can visit virtual environments to view, analyze, evaluate, and create content. Teachers can recreate and reimagine existing architecture or art and use avatars to create new personae and experiences for students and themselves. And because nothing happens in virtual worlds without others, they facilitate collaboration. Immersive environments can provide opportunities for teacher collaboration with regard to ideas, strategies, resources, and rich media (Chen & Law, 2016; González et al., 2011; Yang, 2012).

Finally, in contrast to teacher preparation programs, which often focus heavily on cognition and accumulating a body of knowledge, the immersive models above are practice-based so teachers learn by doing (The Economist, 2021). VR helps to develop pre-service teachers' psychomotor and affective domains because they have immersive experiences that, though they aren't real, *feel* real (Dieker et al., 2013; Grossman et al., 2009). Integrating sensory experiences (via stimuli) with active learning produces learning that is skills-focused and long-term (Mayer, 2009; Robles, 2018, p. 9).

This is how learning to be a teacher should—but mostly does not—occur (The Economist, 2021). Perhaps the main critique of teacher pre-service preparation programs is that that they do not adequately prepare teachers for *how* to teach (Burns, in press). Through virtual, extended, and mixed reality environments, pre-service teachers experience what it feels like to be a teacher and they experience teaching itself. This affective learning, plus the practical classroom management skills they learn, can then be applied to a real classrom where pre-service teachers undergo their teaching practicum or where they go for their first teaching job, so that they feel more prepared to teach than has often been the case (Burns, in press; Grossman et al., 2009).

Immersive media, *ipso facto*, do not necessarily improve learning. However, implementing effective instructional methods *within* immersive virtual environments and contextualizing these immersive learning experiences within a lesson *can* improve learning (Makransky & Mayer, 2022). But for this to occur, some conditions must be met.

First, because of their steep learning curves, VR-powered immersive environments require significant human, technical, and financial investment (González et al., 2011). Second, immersive environments must provide a sense of "real presence," much like the difference between a pre-service teacher *reading* about behavior management versus actually *trying* to manage a group of students in a classroom (Makransky & Mayer, 2022). "Presence" involves the learner drawing upon spatial cues to perceive him/herself being located within this computer-mediated space. It also involves the ability to act and react as if the mediated environment is a plausible space and, as in a physical environment, perform professionally—integrating pedagogy, content, and technology in the role of a teacher (Gandolfini, 2018; Cummings & Bailenson, 2016; Dieker et al., 2013). Finally, reflection—both "on the action" and "in action" before, during, and after the immersive experience—is essential so student teachers can reflect on successes, misconceptions, and errors (Dieker et al., 2013).

## 4.4 Considerations: Multimedia for Distance Education

### 4.4.1 Benefits of Multimedia-based Open and Distance Education

Multimedia has long been valued as a tool for *student* learning, as opposed to *teacher* learning. Yet multimedia offers numerous potential benefits as a distance and open learning model[20] that could be part of any distance education program. These benefits are outlined here.

#### Provide teachers with self-study opportunities

Offline multimedia-based learning has traditionally played a prominent role in self-paced teacher learning as part of pre-service and in-service education programs. Across Sub-Saharan Africa, in Namibia, Zambia, Uganda, and the Democratic Republic of Congo, and refugee camps in Kenya, the Central African Republic, South Sudan, Nigeria and Ethiopia teachers access self-paced units of study, downloadable reading materials, glossaries, quizzes and interactive materials provided to them on CD-ROMs, DVDs, SD cards for phones, and USB drives.

In 2011, the Higher Education Commission of Pakistan revised the base qualifications for teachers, from a two-year Associate Degree in Education (ADE) to a four-year Bachelor of Science Degree by 2013. Thus, in-service teachers with an ADE degree were required to begin the process

[20] Because the computer acts as a teacher and multimedia is typically used as a self-paced, self-instructional tool, we refer to this model as open learning that may or may not form part of a distance education program.

of upgrading their qualifications.[21] For many female teachers, however, geography and cultural constraints made it impossible to travel to attend in-person professional development. More often than not, these women also lacked Internet access.

In response, USAID Pre-Service Teacher Education Project developed a "blended learning" (i.e., multimedia DVD-based) toolkit, with eight blended learning modules that included teaching early literacy; assessment; collaborative learning; and teaching primary-level science. Teachers read about an approach, watched animations explaining how to set up the approach, and analyzed an interactive classroom video example of the approach ("interactive" since the video posed reflection questions to teachers after each segment). Though there are no data on the effectiveness of this approach, the toolkits provided teachers access to training that otherwise would have been unavailable. The toolkit is presently used in three of Pakistan's Provincial Institutes for Teacher Education[22] and affiliated Colleges of Education (Sarwat Alam, personal communication, June 30, 2022).

### Provide access to curriculum resources and teaching materials

Governments often have provided multimedia curriculum content to teachers who may lack access to technology, learning materials, textbooks, or who may not have the skills to develop curriculum-based lessons and materials. Between 2003–2007, as part of its National Distance Learning Program for All Rural Schools, the Chinese government distributed CD players and CD-ROMs with curriculum materials and educational content to 110,000 village classes and 380,000 rural primary schools.

China's Jiangsu Radio and Television University, in partnership with China's Central Radio and Television University, focused on the use of multimedia as a main component of its upgrading of teachers' qualifications and pedagogical competencies in English-language instruction. Findings revealed that the multimedia program helped lower the teacher attrition rate from the radio and television–based university, increased learner (i.e., teacher) satisfaction, and improved learner outcomes (Zhang & Hung, 2007).

In addition to government-provisioned multimedia, Open Educational Resources (OER), because of their open and repurposable nature, provide teachers with teaching and learning materials that they can adapt and reuse for teaching. Additionally, teachers can remix original OER to create multiple derivatives and versions (Wiley, n.d.). OER will be discussed in greater detail in *Chapter 12: Developing Content.*

### Drive changes in instructional design and instruction

Across many parts of the globe, teachers often have large classes and no teaching and learning materials aside from a textbook or a chalkboard. They are forced by necessity to teach in highly traditional, lecture-based ways, while students copy notes into a notebook or onto a slate. A number of efforts have attempted to capitalize on teaching and learning materials to help teachers change instruction and learn how to teach with technology.

One such effort is Teacher Education in Sub Saharan Africa (TESSA), a consortium of the UK Open University and institutes of higher education that have teacher education programs. The consortium, through Open Learn, offers highly structured OER study units to support school-based teacher learning.

Teachers are encouraged to use the open resources in ways that meet their needs. To help teachers learn instructional design skills, materials can be shared and easily reused or customized, reflecting

[21] For more information, see https://hec.gov.pk/english/services/universities/RevisedCurricula/Documents/2011-2012/Education/ADEinService.pdf
[22] These three institutions are in Khyber Pakhtunkhwa, Sindh, and Baluchistan provinces.

local contexts and language needs, without being completely reworked. Access to technology makes design and modification, revision, and exchange of ideas easier than would otherwise be the case (F. Wolfenden, personal communication, October 14, 2022). As of 2012, almost 300,000 teachers had interacted with TESSA materials via their Sub-Saharan Africa partner institutions. The program has since expanded to India (TESS-India) (McAleavy et al., 2018, p. 35).

These OER, which include graphic organizers, *PowerPoints*, video, and audio, are indexed to national curricula of 23 countries[23] and are available in English, French, Arabic, and Kiswahili (Wolfenden et al., 2012). Until 2019, teachers and teacher educators received support and instruction to adapt these materials to their national curriculum and teach with these materials. Since 2019, many programs, such as Zambia's Education School-based Training (ZEST) program, have continued to use these multimedia materials even without the personal support (F. Wolfenden, personal communication, October 14, 2022).

### Help teachers adopt learner-centered approaches with technology

Technology has a uniquely motivating effect on teachers who are generally and genuinely keen to learn how to use it (Burns, in press). The use of multimedia, combined with digital technologies, can successfully spur teachers to change teaching practices. In Yemen, EDC, in partnership with Intel Ireland, provided junior secondary math and science teachers with a suite of multimedia apps as well as intensive professional development. Teachers learned to use the apps to supplement their teaching, learned how to integrate the use of apps into project-based learning, and learned how to design lessons that integrated multimedia and project-based learning.

A well-known example illustrating the potential of multimedia to shift instruction is the OER4Schools initiative in Zambia (2009–2017) and its extension to Zimbabwe (2019). Researchers reported that teachers were more likely to use engaging pedagogical techniques such as practical and group work after participating in the program (Haßler et al., 2020; McAleavy et al., 2018; Walker et al., 2022). Lesson videos of interactive teaching in the local context were embedded in a multimedia resource. The resource also included built-in educator notes and prompts to facilitate discussion and support teacher reflection and development of their own practices (Hennessy et al., 2016).

Similar interventions that helped teachers to teach with and design learning activities involving multimedia and technology show that teachers who engage with multimedia are more likely to embrace learner-centered approaches and more likely to be rated higher on measures of constructivist approaches than are teachers who do not use multimedia (Dimock et al., 2001).

### Provide teachers with a range of diverse, technology-based learning

Multimedia applications, if designed well, offer diverse and school-based professional development opportunities. Rich media can engage teachers on several cognitive levels and can address multiple ways of learning. Interactive software, such as *Geogebra* and other types of multimedia, allows teachers to learn content alongside their students and builds teachers' confidence in their content knowledge and use of technology (Wartella et al., 2016). Animations can help teachers follow procedures and processes. Simulations can engage teachers in learning experiences that might otherwise be physically or logistically impossible and/or prohibitively expensive. A good Intelligent Tutoring System (ITS) may substitute for a university tutor, assess teacher learning, and adapt content to the

[23] These are Angola, Botswana, Ethiopia, the Gambia, Ghana, Kenya, Lesotho, Liberia, Malawi, Mauritius, Mozambique, Namibia, Nigeria, Rwanda, São Tomé and Príncipe, Seychelles, Sierra Leone, South Africa, South Sudan, Swaziland, Uganda, Zambia, Zimbabwe. It should be noted that as of June 2022, there were no Portuguese-language materials, despite the inclusion of three Lusophone countries in the TESSA database.

teacher's cognitive level. And digital learning games can instill motivation to learn, thinking and problem-solving skills, enhanced content-based knowledge, skills, and behaviors, and can help teachers refine content skills or engage in game-based educational play, help with self-regulation, and increase awareness of the importance of collaboration in learning—all qualities that we would hope to see, not just in our students, but in our teachers.

#### Promote teacher empathy regarding how students learn

Participating in immersive, engaging, and challenging multimedia environments can help teachers see learning from the point of view of a student and understand the importance of multiple representations of information, motivation, fun, play in learning, and multimedia learning in action. Such a cognitively and affectively empathetic understanding of student learning might influence how teachers structure classroom learning opportunities. While a teacher might not have the digital tools or skills to create an online immersive environment, he or she could integrate elements of game-based learning into offline games and activities.

### 4.4.2 Limitations of Multimedia-based Open and Distance Learning

Despite its many potential benefits, the broad category of multimedia is not without its drawbacks. These include the following.

#### Heterogeneity of design

While this is a strength of multimedia, it also can result in qualitatively different learning experiences and levels of learning (i.e., lower order versus higher order). One multimedia application may be open and exploratory in its design, where the application functions as a tool for inquiry and higher-order thinking. Another may be focused on information regurgitation, in which learning is rote and passive and the multimedia application itself is merely a delivery system for fact-based, low-level thinking. This latter accusation has been leveled particularly at the "tutoring" aspects of CAI. Indeed, a lot of multimedia suffers from the "old wine in new skins" syndrome, promising critical thinking and exploration but delivering learning that is didactic and behaviorist. They may be easy to "game"—learners will rapidly repeat the same answer or blank answers to elicit the correct answer from the system (Baker et al., 2010); they promote lower-order versus higher-order thinking; or they offer "feedback" that does nothing to scaffold the metacognitive processes necessary to correct misunderstandings and arrive at a correct response.

#### Lack of quality assurance

A good deal of multimedia, particularly commercial educational technology products, are not assessed for quality (Van Nostrand et al., 2022). There may not be standards by which to assess quality. Most multimedia applications are not available in local languages. Digital learning games may not be culturally appropriate. Teachers may have a very difficult time using software that demands problem solving, hypothesis generation, pattern seeking, and extemporaneous thinking when they have never been asked to do so previously. Numerous games are marketed as learning tools that, though engaging, and stimulating, offer little in the way of deep content learning.

#### Fixed mindsets about multimedia

Multimedia, such as digital learning games or virtual reality, may be seen by administrators and policymakers as frivolous games or toys or too dystopian and "out there" to be appropriate models of teacher education. As noted earlier, Virtual Reality has long been the "next big thing" in teacher education but its actual use is minimal and suggestions about its potential effectiveness as a teacher education tool are often met with eyerolls.

The opposite also may be true: Multimedia (for example, CAI or Intelligent Tutoring Systems) may be seen as a financially attractive option for teacher professional development that can eliminate the need for human facilitators and the costs and logistics associated with any larger program of professional development. While the Artificial Intelligence that programs ITS has dramatically evolved, it still cannot perform the many critical actions that human-mediated forms of distance learning can do, such as sensing emotions, comforting a troubled learner, and offering deep encouragement.

### Many types of multimedia are expensive to purchase and create

Many multimedia applications are free, while others may be quite pricey. This is particularly true for many digital games and VR and AR applications. VR and AR headsets can run from a few hundred U.S. dollars for Meta's Quest 2 VR headset (on Amazon) to $3,500 for Microsoft's least expensive Hololens 2 (Microsoft, 2022). Immersive environments, in particular, are expensive, and because they are "locked" systems, they currently are impossible to modify. However, there is more of a détente between third-party developers and proprietary systems (Warburton, 2009). For example, *Open Wonderland*[24] is an open source, Java-based kit that allows users to create their own virtual 3-D world. *OpenSim* and *Second Life* have released their code as open source. Vuforia Augmented Reality Development Kit offers free-trial versions of its platform and apps. Popular platforms such as *Unreal Engine, Discord, Panoform, Frame,* and Google *Expeditions* allow teachers and teacher educators to create augmented and virtual worlds and immersive activities, while platforms like *Roblox* allow users to play games created by other users. Further, distance education providers can create their own games (such as Escape Rooms), VR-like features and simulations, and virtual tours with simpler and less expensive digital tools such as *Genially, Articulate Storyline*, and *ThingLink.*[25]

One feature that also should take a bite out of cost is that HMD VR does not require laptops—everything takes place within the headset. However, it does require robust bandwidth, and many serious VR users invest in extra bandwidth.

### Certain types of multimedia have high adoption barriers

In addition to expense, immersive environments, such as virtual worlds and simulations, possess numerous barriers to adoption. They can be disorienting, and teachers will need scaffolding and technical support, especially initially, to navigate either desktop-based VR or head mounted display VR. It may be difficult for teachers who have never before been asked to suspend disbelief, think critically or independently, or interact with avatars to do so in an environment as surreal as a virtual world. It also may be hard for teachers to interact with complex simulation software. Without on-site support and scaffolding, teachers who lack persistence will simply give up when faced with technical problems or with the open-ended nature of many immersive environments. Some immersive environments, like some digital learning games, may involve the use of avatars, tasks, and behaviors that in many cultures may be considered inappropriate. These issues, combined with the research gaps around AR and VR in in teacher training (Wyss et al., 2021) and aforementioned high costs, may work against any sort of large-scale adoption of AR or VR for teacher education.

### Immersive environments can pose physical and emotional challenges for learners

This is particularly true with AR and VR. For many teachers or teacher educators, VR may range from the physically disorienting to hallucinatory. The illusions induced by movement-based VR such as flying simulations or playing a sport can be nausea inducing for some.[26] Even non-movement VR applications make tracking and navigating via hand controls or one's fingers difficult or frustrating, at least at first. Users may experience eye strain, dizziness, neck and shoulder pain and headaches. Indignities abound in the use of VR headsets. The author nearly fell out of her chair

[24] See http://openwonderland.org/

[25] For examples of digital learning games created via *ThingLink*, see: https://www.thinglink.com/scene/688406138344964096

[26] VR experiences feel so real that motion sickness has been a common side effect. This has spawned a host of accessories for VR users, such as an acupressure anti-nausea wristband for VR systems and stabilization VR headsets. See https://www.healthline.com/health/vr-motion-sickness.

and onto a coffee table making a leaping catch of a (virtual) baseball. Being the only person engaging with virtual activities wearing an HMD will undoubtedly provoke a good deal of attention, some befuddlement, and even laughter from non HMD-wearing classmates or onlookers.

Though the above issues raise questions about the viability of using virtual worlds and immersive environments for large-scale teacher professional development, the potential learning benefits of immersive environments certainly warrant exploration in some well-designed pilot or proof-of-concept programs (Warburton, 2009, p. 418).

## 4.5 Summary of Multimedia-based Distance Education

Figure 4.7 summarizes the role of computer-based multimedia as a distance learning tool for teacher education and lists its strengths and limitations as a mode of distance education.

**Figure 4.7**
**Summary of Multimedia-based Distance Education**

| Roles in Teacher Professional Development | Strengths | Limitations |
|---|---|---|
| • Teachers interact with content that is provided in a number of different formats: text, audio, animation, video.<br>• Multimedia can be used for self-paced self-study or group-based collaboration or competition.<br>• It is typically used to expand teachers' content knowledge and understanding of processes associated with certain events.<br>• Many types of multimedia, such as virtual reality and extended reality, are used to provide teachers with learning and experiences that would otherwise be too difficult, expensive, or dangerous.<br>• It can be used to help teachers think like subject-area specialists (such as historians or mathematicians) to help develop content-based thinking.<br>• Web-based, displayed on mobile devices or portable gaming systems, or stand-alone applications provide interaction with a variety of media.<br>• Virtual worlds can be used to help teachers develop knowledge habits of mind and 21st-century skills, such as creativity and problem solving. | • Allows local content producers to create contextually genuine learning content, increasing the relevance of the training message to their audience by providing it in local language and with authentic media and graphics.<br>• It may give teachers ideas about more interactive pedagogies and ways to address their students' varied learning styles.<br>• Offline multimedia content makes learning available to the billions of learners at the "bottom of the pyramid."<br>• Immersive environments allow learning by discovery, experimentation, guidance using a variety of instructional approaches, or practice and feedback.<br>• Games, immersive environments, and multimedia applications can assess deep understanding, inquiry, or problem solving in the classroom. Teachers can use this information to make beneficial changes in instruction.<br>• Depending on the design, it may model higher order thinking skills (problem solving and analysis), as well as 21st-century skills (collaboration, learning, and innovation skills, as well as media and information skills). | • Complex software may require both time and ongoing technology training to be effective.<br>• Teacher-candidates/teachers who have not had practice in developing higher-order thinking skills as part of their teacher formation may be lost and unable to participate in multimedia learning without extensive professional development and ongoing support.<br>• After some time, especially with more simple games and applications, users become bored as they exhaust all of its potential.<br>• "Gaming the games:" Evidence shows that learners figure out how to manipulate poorly designed or simple games versus truly mastering the domain of knowledge.<br>• Even commercially produced software may not meet basic standards around engagement, active learning, and appropriateness.<br>• Expenses include hardware, software, robust video cards, high-speed Internet access and training.<br>• Multimedia may be expensive, not culturally appropriate, and unavailable in a local language. |

| Roles in Teacher Professional Development | Strengths | Limitations |
|---|---|---|
| | • It may be used to teach content to students in areas where teachers' knowledge about that particular content topic is weak. | • Discrimination is a must—there is a lot of really poor educational software on the market.<br>• Games, CD-ROMs, and other multimedia may not be aligned with teacher training standards or curriculum standards. |

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## References


Ade-Ojo, G., Markowski, M., Essex, R., Stiell, M., & Jameson, J. (2022). A systematic scoping review and textual narrative synthesis of physical and mixed-reality simulation in pre-service teacher training. *Journal of Computer Assisted Learning*, *38*(3), 114. https://doi.org/10.1111/jcal.12653

Arizona State University. (2020, September 18). *'Dreamscape learn' to transform educational experience through exploration.* ASU News. https://news.asu.edu/2020-09-18-discoveries-dreamscape-immersive-asu-partnership-virtual-reality-learners-worldwide

Bakan, U., & Bakan, U. (2018). Game-based learning studies in education journals: A systematic review of recent trends. *Actualidades Pedagógicas, 72,* 119–145. doi:https://doi.org/10.19052/ap.5245

Baker, C. (2010). The impact of instructor immediacy and presence for online student affective learning, cognition, and motivation. *Journal of Educators Online*, *7*(1), 1–30. doi:10.9743/JEO.2010.1.2

Banerjee, A., Cole, S., Duflo, E., & Linden, L. (2007). Remedying education: Evidence from two randomized experiments in India. *The Quarterly Journal of Economics, 122*(3), 1235–1264. https://doi.org/10.1162/qjec.122.3.1235

Baron, J., Taveras, C., & Zuñiga, J. (2018, December 19). *Adaptive technology to help improve math learning in the Dominican Republic.* World Bank Blogs. https://blogs.worldbank.org/education/adaptive-technology-help-improve-math-learning-dominican-republic

Barrow, L., Markman, L., & Rouse, C. (2009). Technology's Edge: The educational benefits of computer-aided instruction. *American Economic Journal: Economic Policy*, *1*(1), 52–74. doi:10.1257/pol.1.1.52

Bau, N., & Das, J. (2020). Teacher value added in a low-income country. *American Economic Journal: Economic Policy*, *12*(1), 62–96. doi:10.1257/pol.20170243

Bauld, A. (2019, September 11). *Virtual reality for teachers.* Harvard Graduate School of Education. https://www.gse.harvard.edu/news/19/09/virtual-reality-teachers

Buckley, J., Colosimo, L., Kantar, R., McCall, M., & Snow, E. (2021a). *Game-based assessment for education.* OECD Digital Education Outlook 2021: Pushing the Frontiers with Artificial Intelligence, Blockchain and Robots: https://doi.org/10.1787/589b283f-en

Buckley, J., Piacentini, M., & von Davier, A. (2021b). Towards a new generation of assessment. *Digital Education for a Strong Recovery: A Way Forward.* Organisation for Economic Co-operation and Development.

Burns, M. (2010). Not too distant: A survey of strategies for teacher support in distance education programs. *Turkish Online Journal of Distance Education*, *11*(2), 108–117. https://dergipark.org.tr/tr/pub/tojde/issue/16908/176338

Burns, M. (2021). *Background paper prepared for the 2023 global education monitoring report, Technology and education: Technology in education.* United Nations Educational, Scientific and Cultural Organization. https://unesdoc.unesco.org/ark:/48223/pf0000378951

Burns, M. (in press). *Barriers and supports for technology integration: Views from teachers. Background chapter prepared for the global education monitoring report: Technology and education.* United Nations Educational, Scientific and Cultural Organization.

Byun, J., & Joung, E. (2018). Digital game-based learning for K-12 mathematics education: A meta-analysis. *School Science and Mathematics, 118*(3-4), 113–126. doi:https://doi.org/10.1111/ssm.12271

Chen, C.-H., & Law, V. (2016, February). Scaffolding individual and collaborative game-based learning in learning performance and intrinsic motivation. *Computers in Human Behavior, 55*(Part B), 1201–1212. doi:https://doi.org/10.1016/j.chb.2015.03.010

Chen, M., Tseng, W., & Hsiao, T. (2018, January). The effectiveness of digital game vocabulary learning: A framework-based view of meta-analysis. *British Journal of Educational Technology, 49*(1), 69–77. doi:http://dx.doi.org/10.1111/bjet.12526

Childers, G., & Hite, R. (2022). The role of emerging technologies in science teacher preparation. In J. Luft, & M. Jones (Eds.), *Handbook of research on science teacher education.* Routledge.

Chung, G. (2014). Toward the relational management of educational measurement data. *Teachers College Record*, *116*(11), 1–16. doi:https://doi.org/10.1177/016146811411601115

Clark, D., Nelson, B., Sengupta, P., & D'Angelo, C. (2009). Rethinking science learning through digital games and simulations: Genres, examples, and evidence. *The National Research Council Workshop on Gaming and Simulations, October 6–7.*

Cohen, J., Wong, V., Krishnamachari, A., & Berlin, R. (2020). Teacher coaching in a simulated environment. *Educational Evaluation and Policy Analysis, 42*(2), 208–231. doi:10.3102/0162373720906217

Crosswater Digital Media. (2022). *Crosswater digital media.* Immersive Education. https://crosswater.net/immersive-education/

Csikszentmihalyi, M. (1990). *Flow: The psychology of optimal experience.* Harper Collins.

Cummings, J., & Bailenson, J. (2016). How immersive is enough? A meta-analysis of the effect of immersive technology on user presence. *Media psychology, 19*(2), 272–309. https://doi.org/10.1080/15213269.2015.1015740

Davis, T., Merchant, Z., & Kwok, O.-M. (2022). An examination of practice-based virtual simulations and pre-service mathematics teaching efficacy and outcome expectancy. *Education Sciences, 12*(4), 1–20. http://dx.doi.org/10.3390/educsci12040262

De Freitas, S. (2006). *Learning in immersive worlds.* Joint Information Systems Committee.

Dieker, L., Rodriguez, J., Lignugaris/Kraft, B., Hynes, M., & Hughes, C. (2013). The potential of simulated environments in teacher education: Current and future possibilities. *Teacher Education and Special Education*, 21–33. doi:https://doi.org/10.1177/0888406413512683

Dimock, K. V., Burns, M., Heath, M., & Burniske, J. (2001, December). *Applying technology to restructuring learning: How teachers use computers in technology assisted constructivist learning environments.* Southwest Educational Development Laboratory.

EdSurge. (2013). *Gamification vs. game based learning.* EdSurge. https://edsurge.imgix.net/static_assets/custom/minecraft/GBL_v_Gamification.jpg

EduPARK. (n.d.). *EduPARK project.* EduPARK Mobile Learning, Augmented Reality and Geocaching in Science Education. http://edupark.web.ua.pt/

Escueta, M., Nickow, A., Oreopoulos, P., & Quan, V. (2020). Upgrading education with technology: Insights from experimental research. *Journal of Economic Literature, 58*(4), 897–996. doi:10.1257/jel.20191507

Feldstein, M. (2013, December). What faculty should know about adaptive learning. *American Federation of Teachers On Campus.*

Gandolfini, E. (2018). Virtual reality and augmented reality. In K. Kennedy, & R. Ferdig (Eds.), *Handbook of research of K12 online and blended learning* (2nd ed., pp. 545-562). Carnegie Mellon University: ETC Press. https://www.learntechlib.org/p/182993/

Gee, J. (2003). *What video games have to teach us about learning and literacy.* Palgrave.

Gee, J. P., & Shaffer, D. W. (2010). *Looking where the light is bad: Video games and the future of assessment. (Epistemic Games Group working paper no. 2010-02).* University of Wisconsin-Madison. https://www.semanticscholar.org/paper/Looking-where-the-light-is-bad%3A-Video-games-and-the-Gee-Shaffer/d0d7c77a88415838206f317c899e1ad7975e89ed

González, D., Palomeque, C., & Sweeney, P. (2011). Teaching Spanish in second life. In M. Thomas (Ed.), *Digital education: Opportunities for social collaboration* (pp. 143–166). Palgrave Macmillan.

Grossman, P., Compton, C., Igra, D., Ronfeldt, M., Shahan, E., & Williamson, P. (2009, September). Teaching practice: A cross-professional perspective. *Teachers College Record, 111*(9), 2055–2100. https://tedd.org/wp-content/uploads/2014/03/Grossman-et-al-Teaching-Practice-A-Cross-Professional-Perspective-copy.pdf

Hanghøj, T., Lieberoth, A., & Misfeldt, M. (2018). Can cooperative video games encourage social and motivational inclusion of at-risk students? *British Journal of Educational Technology, 49*(4), 775–799. https://doi.org/10.1111/bjet.12642

Haßler, B., Hennessy, S., & Hoffman, R. (2020). OER4Schools: Outcomes of a sustained professional development intervention in Sub-Saharan Africa. *Frontiers in Education.* doi:https://doi.org/10.3389/feduc.2020.00146

Hennessy, S., Haßler, B., & Hofmann, R. (2016). Pedagogic change by Zambian primary school teachers participating in the OER4Schools professional development programme for one year. *Research Papers in Education, 31*(4), 399–427. https://doi.org/10.1080/02671522.2015.1073343

Herrman, J., & Browning, K. (2021, July 10). Are we in the metaverse yet? *New York Times.* https://www.nytimes.com/2021/07/10/style/metaverse-virtual-worlds.html

Jiang, X., Chen, H., Portnoff, L., Gustafson, E., Rollinson, J., Plonsky, L., & Pajak, B. (2021). *Seven units of Duolingo courses comparable to 5 university semesters in reading and listening: Duolingo Research Report DRR-21-03 November 11, 2021.* Duolingo. https://www.duolingo.com/efficacy

Kaleli, Y. (2020). The effect of computer-assisted instruction on piano education: An experimental study with pre-service music teachers. *International Journal of Technology in Education and Science, 4*(3), 235–246. http://ijtes.org/index.php/ijtes/article/view/115/pdf

Klopfer, E., Osterweil, S., & Salen, K. (2009). *Moving learning games forward: Obstacles, opportunities and openness.* Massachusetts Institute of Technology Education Arcade. https://education.mit.edu/wp-content/uploads/2018/10/MovingLearningGamesForward_EdArcade.pdf

Knowles, M. (1975). *Self-directed learning: A guide for learners and teachers.* Association Press.

Krashen, S. (2014). *Does Duolingo "trump" university-level language learning?* http://sdkrashen.com/content/articles/krashen-does-duolingo-trump.pdf

Kulik, J. (2003). *Effects of using instructional technology in elementary and secondary schools: What controlled evaluation studies say.* SRI International.

Ledger, S., Burgess, M., Rappa, N., Power, B., Wong, K., Teo, T., & Hilliard, B. (2022). Simulation platforms in initial teacher education: Past practice informing future potentiality. *Computers and Education, 178.* https://doi.org/10.1016/j.compedu.2021.104385

Lim, C., & Kye, B. (2019). *Classroom revolution through SMART education in the Republic of Korea. Case study by the UNESCO-Fazheng Project on Best Practices in Mobile Learning.* UNESCODOC Digtal Library. https://unesdoc.unesco.org/ark:/48223/pf0000366729

Llywodraeth Cymru (Welsh Government). (n.d.). *Minecraft: Education edition.* Llywodraeth Cymru (Welsh Government): https://hwb.gov.wales/minecraft/training-and-support

Lucas, K., & Sherry, J. (2004). Sex differences in video game play: A communication-based explanation. *Communication Research, 31*(5), 499–523. doi:https://doi.org/10.1177/0093650204267930

Lui, M., & Slotta, J. (2014, January). Immersive simulations for smart classrooms: Exploring evolutionary concepts in secondary science. *Technology Pedagogy and Education, 23*(1). doi:10.1080/1475939X.2013.838452

Makransky, G., & Mayer, R. (2022). Benefits of taking a virtual field trip in immersive virtual reality: Evidence for the immersion principle in multimedia learning. *Educational Psychology Review*, 1–28. https://doi.org/10.1007/s10648-022-09675-4

Marques, M., & Pombo, L. (2021). Teachers' experiences and perceptions regarding mobile augmented reality games: A case study of a teacher training. In L. Chova, A. Martínez, & I. Torres, *International Technology, Education and Development (INTED) Conference Proceedings.* Online.

Mattoo, S. (2022, September 6). *G2.* What Is virtual reality? Types, benefits, and real-world examples. https://www.g2.com/articles/virtual-reality

Mayer, R. (2009). *Multimedia learning* (2nd. ed.). Cambridge University Press.

McAleavy, T., Hall-Chen, A., Horrocks, S., & Riggall, A. (2018). *Technology-supported professional development for teachers: Lessons from developing countries.* Education Development Trust. https://www.educationdevelopmenttrust.com/EducationDevelopmentTrust/files/34/3463d85a-031c-4f1e-9002-969b4daf4cdf.pdf

McCarthy, E., Tiu, M., & Li, L. (2018). Learning math with Curious George and the Odd Squad: Transmedia in the classroom. *Technology, Knowledge and Learning, 23*, 223–246. doi:https://doi.org/10.1007/s10758-018-9361-4

McIsaac, M., & Gunawardena, C. (1996). Distance education. In D. Jonassen (Ed.), *Handbook of research for educational communications and technology: A project of the Association for Educational Communications and Technology* (pp. 403–437). Simon & Schuster Macmillan.

Meihami, H., & Esfandiari, R. (2021). Exploring EFL teachers' professional identity development in a CALL teacher preparation program. *The JALT CALL Journal, 17*(2). https://doi.org/10.29140/jaltcall.v17n2.404

Microsoft. (2022). *HoloLens 2: For precise, efficient hands-free work*. Microsoft. https://www.microsoft.com/en-us/hololens/buy

Mo, D., Zhang, L., Luo, R., Qu, Q., Huang, W., Wang, J., . . . Rozelle, S. (2014). Integrating computer-assisted learning into a regular curriculum: Evidence from a randomised experiment in rural schools in Shaanxi. *Journal of Development Effectiveness, 6*(3), 300–323. doi:10.1080/19439342.2014.911770

Muralidharan, K., Singh, A., & Ganimian, A. J. (2019). *Disrupting education? Experimental evidence on technology-aided instruction in India. Working Paper 22923.* National Bureau of Education Research. http://www.nber.org/papers/w22923

Mursion. (2022). *Simulation training for educators, students, and lifelong learners.* Mursion. https://www.mursion.com/services/education/

North American Scholastic eSports Federation. (2022). *NASEF's MENAcraft.* North American Scholastic eSports Federation. https://www.nasef.org/menacraft

Pekrun, R., & Linnenbrink-Garcia, L. (2012). Academic emotions and student engagement. In S. Christenson, A. Reschly, & C. Wylie (Eds.), *Handbook of research on student engagement.* Springer.

Rivera, O., Amador, A., Ruiz-Gaona, L., & Gómez Treviño, D. (2022, June). *Implementation challenges of an impact assessment: The ATEMA project in Puerto Rico.* Abdul Latif Jameel Poverty Action Lab. https://www.povertyactionlab.org/blog/6-29-22/implementation-challenges-impact-assessment-atema-project-puerto-rico?lang=en

Robles, D. (2018). Text2teach educational media: Implementer's feedback and learner's academic performance. *International Journal of Physics & Mathematics, 1*(1), 8–20. https://doi.org/10.31295/ijpm.v1n1.39

Roundtable Learning. (n.d.). *What is 3DoF (Three Degrees of Freedom)? Less Than 100 Words.* Roundtable Learning. https://roundtablelearning.com/what-is-3dof-three-degrees-of-freedom-less-than-100-words/

Russo, J., Bragg, L., & Russo, T. (2021). How primary teachers use games to support their teaching of mathematics. *International Electronic Journal of Elementary Education, 13*(4), 407–419. https://www.iejee.com/index.php/IEJEE/article/view/1302

SchoolSims. (2022). *SchoolSims: Experience is the best teacher.* https://schoolsims.com/overview/

Snilstveit, B., Stevenson, J., Phillips, D., Vojtkova, M., Gallagher, E., Schmidt, T., . . . Eyers, J. (2015). *Interventions for improving learning outcomes and access to education in low- and middle- income countries: A systematic review, 3ie Systematic Review 24.* International Initiative for Impact Evaluation (3ie). https://www.3ieimpact.org/sites/default/files/2019-01/SR24-education-review_2.pdf

Southern Methodist University Simmons School of Education and Human Development. (2022). *Enigma adult literacy android app in development.* https://www.smu.edu/Simmons/Research/Center-for-Virtual-Reality-Learning-Innovation/Game-Based-Learning-Literacy-Applications/Enigma-Lost-Words-of-Atlantis

Spires, H. (2015). Digital game-based learning: What's literacy got to do with it? *Journal of Adolescent and Adult Literacy.* doi:https://doi.org/10.1002/jaal.424

Takeuchi, L., & Vaala, S. (2014). *Level up learning: A national survey on teaching with digital games.* The Joan Ganz Cooney Center at Sesame Workshop.

Tausin, M., & Stannard, L. (2018). *EdTech for learning in emergencies and displaced settings: A rigorous review and narrative synthesis.* Save the Children. https://resourcecentre.savethechildren.net/library/edtech-learning-emergencies-and-displaced-settings-rigorous-review-and-narrative-synthesis

Ter Vrugte, J., De Jong, T., Vandercruysse, S., Wouters, P., Van Oostendorp, H., & Elen, J. (2015). How competition and heterogeneous collaboration interact in prevocational game-based mathematics education. *Computers & Education, 89,* 42–52. doi:https://doi.org/10.1016/j.compedu.2015.08.010

The Economist. (2021, September 18). *Edtech that helps teachers beats edtech that replaces them. The Economist.* https://www.economist.com/united-states/2021/09/18/edtech-that-helps-teachers-beats-edtech-that-replaces-them

The Economist. (2022a, April 9). Seeing and believing: From Apple to Google, big tech is building VR and AR headsets. *The Economist.* https://www.economist.com/business/2022/04/09/from-apple-to-google-big-tech-is-building-vr-and-ar-headsets

The Economist. (2022b, July 9 2022). To be a pilgrim: Gaming the Hajj, from the comfort of home. *The Economist,* p. 80.

The Hajj Trail. (2022). *The Hajj Trail.* https://hajjtrail.com/

United Nations Educational, Scientific and Cultural Organization Institute for Statistics. (2016). *The world needs almost 69 million new teachers to reach the 2030 education goals.* UNESDOC Digital Library. https://unesdoc.unesco.org/ark:/48223/pf0000246124

Van Nostrand, P., Noakes, S., Shah, Z., & Luna, L. (2022, February). *An overlooked indicator of edtech quality: The use of learning sciences research.* Digital Promise. https://doi.org/10.51388/20.500.12265/150

Walker, H., Hennessy, S., & Pimmer, C. (2022). Trialling open educational resources for technology-supported teacher professional development in rural Zimbabwe. *2022 Research Papers in Education,* 1–25. https://doi.org/10.1080/02671522.2022.2034925

Wang, L., Chen, B., Hwang, G., Guan, J., & Wang, Y. (2022). Effects of digital game-based STEM education on students' learning achievement: a meta-analysis. *International Journal of STEM Education*, 1–13. https://doi.org/10.1186/s40594-022-00344-0

Warburton, S. (2009). Second life in higher education: Assessing the potential for and barriers to deploying virtual worlds in learning and teaching. *British Journal of Educational Technology, 40*(3), 414–426. https://desarrollodocente.uc.cl/wp-content/uploads/2020/03/Warburton-2009-British_Journal_of_.pdf

Wartella, E., Luricella, A., & Blackwell, C. (2016). *The ready to learn program: 2010–2015 policy brief.* Northwestern University School of Communication. https://cmhd.northwestern.edu/wp-content/uploads/2016/04/RTL-Policy-Brief-2010-2015-Wartella-et-al-FINAL-March-2016.pdf

Wheelock, A., & Merrick, S. (2021, August 10). *Explore these virtual worlds for learning.* International Society for Technology in Education. https://www.iste.org/explore/classroom/explore-these-virtual-worlds-learning

Wiley, D. (n.d.). *Defining the "open" in open content and open educational resources.* http://opencontent.org/definition/

Wolfenden, F., Buckler, A., & Keraro, F. (2012). OER adaptation and reuse across cultural contexts in contexts in Sub Saharan Africa: Lessons from TESSA (Teacher Education in Sub Saharan Africa). *Journal of Interactive Media in Education.* https://files.eric.ed.gov/fulltext/EJ976456.pdf

Wyss, C., Bührer, W., Furrer, F., Degonda, A., & Hiss, J. (2021). Innovative teacher education with the augmented reality device Microsoft HoloLens: Results of an exploratory study and pedagogical considerations. *Multimodal Technology, 5*(8), 1–17. https://doi.org/10.3390/mti5080045

Yang, Y. (2012). Building virtual cities, inspiring intelligent citizens: Digital games for developing students' problem solving and learning motivation. *Computers and Education, 59*(2), 365–377. doi:doi.org/10.1016/j.compedu.2012.01.012

Zhang, X., & Hung, S. (2007). Integration of the high-tech and low-tech in distance teacher training in China: An insight from the case of Jiangsu Radio and Television University. *The International Review of Research in Open and Distance Learning, 8*(1). https://www.irrodl.org/index.php/irrodl/article/view/336

Section I. Chapter 5

# ONLINE LEARNING

## Table of Contents

Online learning is arguably the most common form of distance learning across the globe in the most diverse range of contexts.

## 5.1 Overview

One of the fastest-evolving modes of distance education is online learning—also referred to as *virtual learning*, *eLearning*, or *Web-based learning* (Kizilcec et al., 2017). In the United States, Canada, Europe, Australia, New Zealand, and East Asia—countries in which high-speed broadband access is prevalent, school or home Internet access rates are high, and technology skills are broadly disseminated—online learning is far and away the dominant mode of distance education. It also is increasingly expanding in countries where the above prerequisites are largely absent. Indeed, across the globe, for teachers across a range of wealthy, middle-income, and even low-income countries, online learning *is* distance education.

This expansion is driven by the accelerating rate of global Internet access. As of January 2023, 64.5% of the world's population—over 5 billion people—had Internet access, and 95% had "coverage," that is, they lived within range of a broadband signal (DataReportal, 2023; International Telecommunication Union, 2022; Statista, 2022c). Access across the globe among young users ages 15–24 in particular continues to grow at very high rates (International Telecommunication Union, 2017, as cited in Morris et al., 2021).

The expansion of online learning as an option for teacher professional development stems not just from increasing broadband Internet access but is a result of its multimodal nature. As discussed in the previous four chapters, online learning has appropriated and redefined other modes of open and distance education—print, audio, visually-based distance education, and multimedia forms—to such an extent that in certain contexts these modes are more commonly utilized online versus offline and accessed in digital versus analog form. Thus, for many teachers, online learning has become the most engaging, comprehensive, convenient, and versatile mode of distance education (Burns, in press).

As this chapter will illustrate, online learning for teachers encompasses a wide variety of models. This includes computer-mediated communication (email or communication tools such as *Slack*), self-paced or cohort-based online courses, mini- or "micro" courses, tutorials, e-mentoring, Web 2.0/social media, webinars, webcasts, telecollaborative and tele-research projects, virtual classes, Massive Open Online Courses (MOOCs), and online professional learning communities. This chapter will explore many—though not all—of these models, specifically online courses (asynchronous, synchronous, and bichronous), blended learning and social media.[1]

As we examine online learning in its many iterations and permutations, it is important to be mindful that many of these forms of eLearning, despite their seductiveness, are still evolving.

[1] Chapter 15 will examine online communities of practice and Chapter 16 online coaching and mentoring.

Most of the research that exists appears to be observational versus evidence-based, and often fails to examine *teachers'* experiences of learning. Thus, the degree of rigorous research on the impact of online learning on teacher practice, though expanding, is still less robust than that on other forms of distance education, such as IAI, and is thinner than is the case with face-to-face teacher professional development.

As many readers know too well, the benefits of online learning are powerful but unevenly distributed. Ninety percent of those lacking Internet *coverage* live in Asia, the Pacific islands, or Sub-Saharan Africa (International Telecommunication Union 2017, as cited in Morris et al., 2021). Even where teachers live in areas with Internet coverage, this does not necessarily translate into *usage*. For a variety of financial, technical, or cultural reasons, teachers may not be able to access the existing Internet, know how to use it, or experience opportunities for continuous online learning (International Telecommunication Union, 2022).

The above situation is worse for women, who exceed 60% of the world's teaching force, but use the Internet at far lower rates than do men (Organisation for Economic Co-operation and Development, 2022a,b). The situation is particularly grave in Sub-Saharan Africa, where this gender usage gap is growing (International Telecommunication Union 2017, as cited in Morris et al., 2021, p. 8). Thus, for teachers in many regions of the globe, and especially for female teachers, the online learning activities discussed in this chapter are but a dream.

## 5.2 Online Learning Terminology

Every mode of distance education has its own terminology, perhaps none more so than online learning. Numerous terms are undefined, ill-defined, erroneously conflated, or rapidly evolving. To better navigate the various online learning options outlined in this chapter, Figure 5.1 offers some essential definitions and clarifications of terminology. As online learning continues to evolve, particularly since COVID, this terminology, too, will undoubtedly continue to evolve. While some terms—asynchronous, synchronous, bichronous, and blended learning—will be examined specifically in this chapter, other terms (remote learning, hybrid learning and cohort-based learning) will receive limited attention. Thus, the reader may find Figure 5.1 to be a useful reference for the rest of this chapter and for Section II, which focuses heavily on methods associated with online learning.

## 5.3 What Is Online Learning?

Online learning has traditionally encompassed a continuum of practices, centered primarily on the amount of content and interaction with the instructor offered both on- and offline. In the decade following the Sloan Consortium's 2008 seminal classification, the term "online learning" was categorized as any course or program in which at least 80% of content and interactions were offered online. "Blended" or "hybrid" courses were those that offered between 30% and 79% of their content and interactions online, though a substantial component of learning occurred in face-to-face settings. "Web-facilitated" were classified as courses that had some online learning component (1% or more), but the majority of their interactions were face-to-face. "Traditional learning" was 100% in person (Sloan Consortium, 2008).

Even prior to the COVID-19 pandemic, the above distinctions among in-person, online, blended, and Web-facilitated learning began to dissolve into three broader designations—in-person, online, and blended learning. More changes ensued: In 2012, Massive Open Online Courses (MOOCs) burst onto the higher education landscape with much fanfare and even more consternation.[2] But the real game-changer in terms of conceptualization and categorization

[2] The first MOOC was developed in Canada in 2008 (Pérez Sánchez et al., 2017).

**Figure 5.1**
**Online Learning Terminology**

| Term | Definition |
|---|---|
| **Asynchronous learning** | • In asynchronous learning, students learn at different times and places.<br>• Examples of asynchronous learning include logging into a Massive Open Online Course (MOOC), a Learning Management System (LMS), or Google *Classroom*, and doing readings, watching videos, authoring a report, and taking a test independent of other learners and at a time and place of one's choosing.<br>• Asynchronous learning is often conflated with "self-paced learning." While asynchronous learning typically is self-paced, self-paced learning may be best conceptualized as a subset of asynchronous learning for two reasons:<br>  ◦ Asynchronous courses may involve classes with other learners who contribute to a product but at different times. They may schedule live meetings with an instructor or classmates (if these exist). Thus, learners in asynchronous online courses do not necessarily always work alone though learners in self-paced courses typically do.<br>  ◦ Asynchronous courses often have a syllabus and activities that must be followed and completed according to certain deadlines. Self-paced courses do not. |
| **Bichronous learning** | • The term, "bichronous learning" emerged during remote emergency learning during COVID-19 pandemic school lockdowns. Though the concept is not new the term itself is quite new and therefore not commonly used.<br>• Bichronous learning is online learning that is designed to use both asynchronous and synchronous ways of learning (Martin et al, 2020b).<br>• Examples of bichronous learning include using social media to have a synchronous (live) chat as well as to later curate chat-related resources asynchronously; or an online course that combines weekly synchronous sessions via a Web conferencing platform with individually graded assignments in Google *Classroom* or *Moodle*.<br>• In fact, a far larger percentage of online courses are bichronous because they are designed to have elements of both synchronous and asynchronous learning. |
| **Blended learning** | • Blended learning is *instruction* that combines face-to-face teaching with online learning activities. Blended learning used to be synonymous with hybrid learning. This is no longer the case.<br>• Classroom time may be reduced but is not eliminated; rather, time inside or outside of school may be used for online learning activities.<br>• All learners generally engage in the same activities and keep a similar pace.<br>• Teaching activities are designed to capitalize on the affordances of both the online and in-person modes of learning (Broadband Commission for Sustainable Development, 2021; Contact North \| Contact Nord, 2020). |
| **Cohort-based** | • "Cohort-based" refers to the organization of an online course. It involves a group of online learners who are part of an online course or class, often with an instructor, as in a university based or school district-based online course of a specific duration.<br>• The cohort advances through the course together, meeting specific deadlines for assignments and participating in joint activities often, but not always, synchronously.<br>• Learners in the cohort may or may not work together, though typically they do. |

| Term | Definition |
|---|---|
| **Hybrid learning** | • In hybrid learning, learners enroll to take a course online or face-to-face. Hybrid learning used to be synonymous with blended learning. This is no longer the case. It now refers to the type of *learning institution*, not instruction.<br>• Unlike blended learning, where learners are enrolled in a brick-and-mortar institution but participate in online learning activities, hybrid learning involves some students in the physical classroom while others participate remotely (Broadband Commission for Sustainable Development; 2021; Digital Learning Collaborative, 2020, p. 6).<br>• Learners are *not* required to attend the physical campus on a schedule that approaches a regular school schedule; however, the institution might require students to be on campus a couple of days per week—but never every day (Digital Learning Collaborative, 2020, p. 6).<br>• It enables learners to study in flexible ways, online or face-to-face, according to their circumstances and preferences.<br>• Figure 1.1 in Chapter 1 referred to "dual-mode universities"— educational institutions that offer parallel off-campus and on-campus degree programs, but learners must stay in one track or the other. In contrast, in a hybrid institution this distinction no longer holds. Students can enroll in any type of course—online or face-to-face—simultaneously. |
| **Remote learning** | • Coined during the COVID-19 school closures, "remote learning" (or "emergency remote learning") is a *unique type* of online learning—emergency and temporary in nature and specific to a particular context (COVID-19 pandemic school closures). It is also *ad hoc* versus what should be the planned and purposeful design of online courses.<br>• As Hodges, et. al. (2020) note, the primary objective of remote learning was "not to recreate a robust educational ecosystem but provide temporary access to instruction and instructional supports in a manner that is quick to set up and is reliably available during an emergency or crisis." |
| **Self-paced learning** | • In self-paced learning, the learner works alone at his or her own pace, completing—or not completing—activities of their choosing. There are no classmates, no set assignments, and no deadlines.<br>• As noted previously, "self-paced learning" is often used erroneously as a synonym for "asynchronous learning."<br>• Self-paced courses typically do *not* have a live instructor, though they may have a prerecorded video-based instructor (such as with a MOOC). |
| **Synchronous learning** | • Synchronous learning is the inverse of asynchronous learning—learning occurs at the same time but in different places—and typically involves two-way videoconferencing.<br>• Examples include real-time *Skype* meetings with an instructor (for example, in a tutoring session, class, or meeting, or for office hours) or a *Zoom* class with other learners (as part of a class that meets at specific times). |

of online learning was the COVID-19 pandemic beginning in early 2020.

Before COVID-19, online learning, even with the above-mentioned continuum of practices, essentially followed one template—a largely asynchronous course in a learning management system (LMS) that was part of some formal course of study. As a case in point, in 2019, 56% of all U.S. university-based online courses followed this LMS-based model (Garrett et al., 2021). Online learning *may* have involved the use of Web conferencing tools from time to time—only 1–3% of U.S. universities in 2019 offered predominantly synchronous courses versus asynchronous ones—but this synchronous communication was usually secondary (for "office hours" or tutoring, for example) to the main scope and sequence of the course, which typically occurred asynchronously.

The COVID-19 pandemic and ensuing quarantines and school closures upended this template, both contracting and expanding how "online learning" is conceptualized and implemented. For in-person teacher education programs that were forced to pivot to online instruction beginning with the first pandemic school shutdowns in March 2020, online learning was distilled into—and remains—Web-conferencing–based, synchronous (real-time) classes ("*Zoom* classes").

At the same time, however, the definition of online learning also *expanded*—with online learning encompassing a continuum of practices, content, and interactions that occur online with or without a facilitator. Thus, online learning is now defined as "essentially any learning where more than half of learning takes place via the Internet" (Hoxby, 2017, p. 407). As this chapter will show, this definition unlocks a hitherto closed world of learning opportunities.

In terms of function and purpose, online learning has coalesced into four broad categories.

- **Formal degree programs.** It is used in universities for undergraduate and graduate education as part of formal degree programs consisting entirely of online courses, or including online, face-to-face, or blended courses.
- **Distance education.** It has increasingly become part of distance learning for in-service and pre-service teachers, an approach that has a long history in higher education (Means et al., 2009).
- **Self-directed learning.** It often involves MOOCs, first as online courses open to anyone with an Internet connection and then, increasingly, through fee-based certification programs.
- **Community formation.** For many teachers, online learning occurs through social networking sites where teachers share resources and ideas.

Yet the above four categories do not fully capture the breadth of online learning. For instance, they do not account for the teachers seated across a table from one another at an in-person workshop simultaneously co-creating a Google *Slides* presentation or the informal email or social media-based exchanges of ideas and information among teachers in the same building or formal blended learning. Because the Internet is so ubiquitous, so integral and so embedded into the professional lives of so many of the world's teachers, attempts to delineate and categorize its use are often futile.

## 5.4 Online Learning for Teacher Education

As suggested above, online learning is arguably the most common form of distance learning across the globe in the most diverse range of contexts. This section provides a geographic overview of models of online learning for pre-service and in-service teacher education.

### 5.4.1 Online Learning for Teacher In-service Education

A quick global scan of the online learning landscape reveals its prevalence in in-service teacher professional development. In contexts as diverse as Estonia, Uruguay and Egypt, all teacher professional development is offered online. In Europe, the Council of Europe's Learning Modules Online (LEMON) offers 18 practical teaching and training modules for social science teachers across the continent in topics such as digital citizenship, media literacy, social media, and cyberbullying. All courses are offered free of charge and can be accessed via the Council of Europe online platform. Courses vary in length from 2 to 25 hours, catering to the different needs of different categories of learners (Council of Europe, 2022).

In the Caribbean region, the Open Campus of the University of West Indies proffers a range of teacher education programs—a bachelor's or master's degree in education and a variety of online courses to help teachers gain new skills, upgrade qualifications, or deepen their knowledge of the subject areas they teach. Future and current teachers can take courses from home using *Zoom* and *Moodle* or at one of the Open Campus's 44 distance education centers located throughout the Caribbean (B. Shirley, personal communication, July 18, 2022).

Across Asia, open universities, such as those in India and Nepal, now offer primarily online programs for teacher continuing education. In Qatar, the e-Taleem Online Portal has a catalogue of 55,000 online courses across dozens of degree programs, including in education, for learners in the Middle East and internationally, while the Advanced Learning Interactive Systems Online (ALISON), an Irish for-profit online education platform, has become a popular site for continuous, workplace-based learning, including courses related to teachers and teaching (Hamad International Training Center, 2022; Paudel, 2021) as well as a free course on digital literacy offered in partnership with the mLearning Alliance.

In Sub-Saharan Africa, the Initiative Francophone Pour la Formation à Distance des Maîtres (IFADEM) (2014–2022), a joint initiative of the European Commission and the Organization Internationale de la Francophonie (OIF), provided online training to support the French-language ability of teachers in Chad, Comoros, Burkina Faso, the Central African Republic, the democratic Republic of Congo, Niger, Mali, and the South Pacific nation of Vanuatu (L'Agence Universitaire de la Francophonie, 2017). The African Virtual University, headquartered in Nairobi, Kenya, offers open and affordable distance learning across the African continent.

Even Massive Open Online Courses, which tend *not* to be associated with teacher education, have emerged as a popular form of education for teachers interested in accreditation options (Seaton et al., 2014). A study of the learner population of MOOCs offered by Harvard and the Massachusetts Institute of Technology between 2012 and 2014 found that approximately 40% of participants were past or present teachers (Castaño-Muñoz et al., 2018). Data from Spain confirm a similar high participation rate of teachers in non-teacher training MOOCs (Castaño-Muñoz et al., 2018). These same data also showed that teachers were enthusiastic MOOC participants—significantly more active in forum discussions than were participants from other professions (Castaño-Muñoz et al., 2018).

### 5.4.2 Online Learning for Pre-service Education

Online learning is not just for in-service education. Though it is still a less common form of pre-service teacher education than in-person programs, that is changing (Koenig, 2020). Over the past decade, many teacher training institutions and universities have refashioned themselves from in-person to hybrid institutions in order to capitalize on the Internet to enhance their outreach and customer base. Online *pre-service* teacher education has experienced enormous growth across the globe. Online universities such Hibernia University (Ireland), Western Governors University (U.S.), and online programs such as *Teacher Training UK* all offer initial teaching degrees online. But online teacher preparation is not simply the domain of countries in the Global North. In Brazil, for example, 67% of entrants in initial teacher education programs are enrolled in online programs (Global Education Monitoring Report Team, 2022, p. 6).

In Sub-Saharan Africa, thanks in part to national research and education networks (NRENs),[3] teacher

[3] NRENs are specialized Internet Service Providers (ISPs) operated for and by the educational and research community of a country. They also are the organizations that operate that network, constituted either as a consortium of members, a dedicated agency, a company, a non-governmental organization (NGO), or other type of body (Foley, 2016, p. 5, as cited in Burns et al., 2019). NRENs are organized into regional backbone networks (e.g., the West and Central African Research and Education Network and the UbuntuNet Alliance for Research and Education Networking).

pre- and in-service education online has expanded in universities in the 32 countries that have these NRENs (Burns et al., 2019). In South Africa, the online University of South Africa (UNISA) prepares almost half of South African teachers (Legodi, 2021). Globally, most open universities are now online universities, and many hybrid universities offer more online options than do either open universities or online universities.

### 5.4.3 Online Learning for Refugee and Internally Displaced Learners

Over the last several years, online learning has become an increasingly viable option to increase educational opportunities for refugees and internally displaced persons (IDPs)—though the percentage of refugees accessing online learning is still miniscule—approximately 1% (Halkic & Arnold, 2019). Jesuit Commons: Borderless Higher Education for Refugees (JC: BHER) and Jesuit Commons: Higher Education at the Margins (JC:HEM) are two early examples of higher education programs delivered to those living in refugee camps. JC:HEM offered a university-accredited diploma in Liberal Studies to students in Syria, Malawi, Kenya, and Jordan via the learning management system (LMS) *Blackboard* as well as with Google *Drive* and applications such as *Hangouts*, *Calendar*, and email for content delivery and communication. Courses are designed to be culturally relevant, multicultural in perspectives and design, and delivered using a holistic pedagogical perspective (Mayr & Oppl, 2022). The above two initiatives have blended into Jesuit World Learning, which, as of 2020, offers online and blended certificate programs for educators in Afghanistan, Guyana, India, Iraq, Kenya, Malawi, Myanmar, Philippines, Sri Lanka, and Thailand.

Southern New Hampshire University offers online courses in the Kiziba refugee camp in Rwanda (Mayr & Oppl, 2022). Kiron Open Higher Education, a German non-profit organization, offers refugee learners a two-year online program to assist their completion of studies at a host-country institution (Halkic & Arnold, 2019).

**Figure 5.2**
**Learning Online**

Because of the protean nature of the World Wide Web, the boundaries between Web-based models of distance education are more fluid and offer a range of professional development opportunities that are extensive, wide-ranging, and even overwhelming.

Imagine the delight of a teacher in Chuuk, the Federated States of Micronesia, whose island in 2020 finally received Internet access and who has long struggled to better address the diverse learning needs of many of her students. She begins to scour *YouTube* videos to learn more about teaching children with special needs. As she searches through the Internet, she finds a free online course about inclusive education in a Massive Open Online Course at MOOC.org.

But her Web-based learning does not end there: She signs up for monthly webinars offered by University of Toronto's Adaptive Technology Resource Center. She participates in discussions about teaching children with special needs via the University of Buffalo's Assistive Technology Training Online Project and joins *WhatsApp* and *Facebook* groups comprising teachers across the South Pacific region with whom she exchanges resource and ideas. She may burnish her content knowledge at a website like CAST.org and subscribe to Real Simple Syndication (RSS) feeds to access up-to-date content and new podcasts from *Access to Education*, a site dedicated to teaching children with special needs. She may browse other special education activities in any number of national education portals; co-develop a teaching activity with teachers in her *Facebook* group; or browse *Instagram* or *Pinterest* for interesting teaching ideas.

All of these activities constitute online learning. Indeed, online learning is so highly differentiated that, with reliable and robust Internet access, teachers can interact with a host of global resources and peers in a multitude of formats and in ways that are simply not possible in-person, with any other technology, or via any other form of distance learning.

The African Higher Education in Emergencies Network (AHEEN), based in Nairobi, provides accredited university diplomas, primarily through asynchronous learning, for Education in Emergency (EiE) teachers in low-resource refugee and IDP contexts. AHEEN trains faculty (affiliated with refugee-led organizations) in humanizing digital pedagogies through online webinars and asynchronous support so they can prepare their syllabi for remote delivery in low-connectivity contexts (B. Moser-Mercer, personal communication, October 14, 2022). Teachers in Kenya, Niger, Lebanon, and Chad in EiE contexts, can participate in the *Quality Holistic Learning Project*, a self-paced online course that combines virtual learning circles (McKnight et al., 2022).

Finally, as the examples in Figure 5.2 suggest, an enormous, though unquantified, amount of online learning transcends formal online courses—this includes teachers leveraging online resources, such as video sharing sites and blogs, and online communities for self-study. These self-directed online learning activities are widespread and used by teachers across various contexts—in wealthy schools, middle and low-income contexts, and refugee settings—but they not captured by data nor are they recognized officially as formal teacher online learning (Burns, in press).

This chapter now shifts from this high-level overview of online learning for teacher education to a discussion of three main models of online distance education—blended learning, formal online courses (asynchronous, synchronous, and bichronous), and social media.

## 5.5 Blended Learning

Not all pre- or in-service teacher education will necessarily involve either learning that is entirely face-to-face or entirely online. Increasingly, both pre-service and in-service educational courses combine or blend some elements of in-person and online learning.[4] Because it has emerged as a popular form of teacher professional learning in distance programs, we begin with a discussion of blended learning.

Blended learning has traditionally suffered from the same definitional variability as other online learning terminology (Chigeza & Halbert, 2014). It has been used to refer to learning that occurs both online and offline; learning that employs digital delivery with analog tools (Conn, 2014); technology-assisted learning (Conn, 2014); and learning that teaches teachers while it instructs students (Cardim et al., 2021). It is often synonimized with "hybrid" learning (Sloan Consortium, 2008)—an equivalence that no longer holds true (Broadband Commission for Sustainable Development, 2021; Contact North | Contact Nord, 2020). Thus, the definition of blended learning is often ambiguous and evolving.

This guide uses the standard definition provided by the Christensen Institute, defining blended learning a type of *instruction* that leverages both online and in-person instruction to provide learners with an integrated, more personalized learning experience, including increased student control over the time, place, path, and/or pace of learning (Christensen Institute, 2022).

As discussed in Figure 5.1, online learning is one element of blended learning; the other is in-person learning. Thus, to fully understand *blended* learning, it is important to first consider its benefits and limitations as Figure 5.3 does.

### 5.5.1 Blended Learning for Teacher Education

While the definition of blended learning may be new, the concept is not. Blended learning has long been part of distance education for teachers. Particularly in open universities, learners have

[4] One study found that U.S. university students prefer online learning for early morning courses and for certain undergraduate course topics (history and government, humanities, natural sciences, and social and behavioral sciences). They prefer in-person learning when courses were offered late morning or early afternoon (Mann & Henneberry, 2014).

**Figure 5.3**
**Benefits and Limitations of In-Person Learning**

| Benefits of in-person learning | Limitations of in-person learning |
|---|---|
| • In-person learning humanizes learning. Through the simple experience of "mere exposure" (Zajonc, 1968) and sustained interaction, learners and their instructors form a relationship within a particular content area or area of focus.<br>• It is "high touch" and eliminates the "transactional distance" of online learning—learners separated by geography, time, and technology (Moore, 2013).<br>• It can provide for instruction that is dynamic, spontaneous, and that allows for immediate teacher responses and learner interaction—all of which are difficult to emulate in live *Zoom* meetings or asynchronous classes (Paul & Jefferson, 2019).<br>• It mitigates technical issues. While learners still require telecommunications infrastructure for the online portion of a blended course, their overall education is not threatened by Internet disruptions.<br>• The element of in-person instruction is still important in hiring. For many jobs in education, including teaching, traditional classroom degrees trump online degrees in terms of hiring preferences. Many academic and professional organizations do not consider online degrees on par with campus-based, in-person degrees (Paul & Jefferson, 2019).<br>• It connects learners to a cohort of real (not just virtual) classmates. These relationships are critical for learning, for satisfaction with the learning experience, for persistence, and for successful completion of a learning experience (Paul & Jefferson, 2019).<br>• It can make learning even more flexible—learners may take part in online or in-person learning as they wish.<br>• It offers more just-in-time personalized instruction. The instructor, observing via verbal cues, assessing by walking around the classroom, and engaging in after-class conversations can see where learners need more support or targeted instruction and can provide this (Fabriz et al.,2021). | • In-person learning is often difficult and expensive to scale.<br>• Learning is accessible only to those teachers who are able to attend an in-person workshop; thus, it may be exclusionary.<br>• It is not flexible. Learning occurs at a fixed time and place. It is often not convenient, requires absences from home or work, and may involve considerable effort on the part of the teacher-learner to arrange travel, childcare, time off work, or lessons for a substitute teacher.<br>• Teachers may not interact with technology in an in-person workshop; thus, learning online, for good or for ill, forces teachers to learn how to use technology.<br>• There are high costs associated with in-person professional development—travel of teachers and workshop facilitators, printed materials, rental space, equipment, accommodations, food, etc.<br>• The geographic and temporal constraints of in-person learning mean that it does not hold the same promise for dramatically improved access to postsecondary and continuing education (Jaggars, 2011).<br>• It may not be an optimal fit for learners who are shy, introverted, or don't do well in groups, or learners who may have visual, auditory or mobility issues, if accommodations are not undertaken by in-person professional development providers.<br>• Depending on the nature of the in-person learning, it may be inefficient. While learning behaviors is best done in an in-person setting, learning facts and concepts might be more efficiently learned online.<br>• In large measure, what can be learned is limited by the four walls of the "training room" and the two covers of a book or instructional manual. |

long participated in TV or online classes with regular or periodic meetings with tutors in brick-and-mortar study centers.

Blended learning as a form of teacher education makes sense for several reasons. First, teachers and students appreciate the benefits of online and face-to-face learning (Burns, in press). In the U.S., for example, over 20% of U.S. university students reported a preference for online learning, while 29% preferred in-person learning (the most popular modality) (Robert, 2022). Students and teachers see online learning as playing an increasingly important role in their education, even if they prefer in-person learning, because in-person learning provides direct contact with peers (Burns, in press; Robert, 2022).

Next, teaching is a craft-based profession. Teachers can learn concepts online, while face-to-face learning offers them opportunities to collaborate with other teachers to design, microteach, and receive feedback on a lesson or unit.

Third, teachers already spend a lot of their free time online, learning from and exchanging new information with online social networks, which often comprise other teachers who may be outside their immediate school network (Chigeza & Halbert, 2014). Teachers also exchange information and learn ideas from their in-school, in-person networks (Burns, in press). Blended learning allows teachers to leverage both of these opportunities.

Finally, blended learning opportunities can ostensibly offer teachers the "best of both modes"—online and in-person learning—while eliminating many of the weaknesses associated with each, as discussed in Figure 5.3. While offering the best of both modes of learning, it also can enhance the strengths of each mode to create a learning experience that may be qualitatively better than either alone (Chigeza & Halbert, 2014).

## Models of Blended Learning

The Christensen Institute (2022) identifies seven models of blended learning that educational institutions can employ—for teachers as well as for their students.

1. **Station-Rotation Model.** Within an in-person workshop, an instructor sets up several learning stations for teachers, one or more of which involves online activities. Teachers rotate through these stations. Or learners rotate equally between face-to-face and online components of the course on a fixed schedule, with the same teacher for each in-person component and the online component occurring remotely. For example, Education Development Center employed both of these station-rotation models with university instructors from 2015–2019 as part of its USAID-funded project, *Connecting the Mekong to Education and Training* (COMET).
2. **Face-to-Face Driver Model.** The in-person instructor delivers most of the curriculum and uses online materials to supplement learning. This is a common form of teacher professional development across a variety of contexts.
3. **Flex Model.** The online component delivers most of the information, while an *in-class instructor* or *facilitator* provides flexible support as needed. This model includes individual and small-group face-to-face tutoring. The University of West Indies Open Campus, for example, employs a flex model.
4. **Online Lab Model.** The online instructor delivers the course in a brick-and-mortar classroom, but with aides or support staff supervising learners. In the nation of Georgia, the USAID-funded Georgia Primary Education (G-PriEd) Project (2011–2016) used this model to help teachers learn techniques in reading instruction.
5. **Self-blend Model.** Individual learners take online courses in an *à la carte* fashion as desired. The traditional instruction is brick-and-mortar. This may be one of the most common forms of teacher blended learning across the globe.
6. **Online Platform Model.** Instruction and materials are all online, with learners taking an

online course remotely. Weekly check-ins with a face-to-face supervisor or the instructor are required. This is a common model in open universities.

7. **Flipped Classroom.** With flipped learning[5] an instructor may record a lecture, screencast and/or provide access to videos, readings, open education resources, quizzes, and other resources, which pre-service teachers or in-service instructors work through *prior* to coming to an in-person class or workshop. This appears to be the template for many blended courses, including those for refugees and refugee teachers (see below).

In addition to these models, two additional blended learning models are also common in teacher education.

1. **Before-During-After Approach.** This is like a flipped classroom, but with three phases. In the *before* phase, teachers interact with content; they can replay or revisit parts of what they're trying to learn, take a break, and then come back to the content—something that is not possible in a live workshop. In the *during* phase—the face-to-face workshop—teachers engage in higher-level learning with colleagues and the instructor, creating classroom activities, practicing, evaluating, discussing, and revising these activities. In the *after* phase, also online, teachers engage in another virtual activity that extends or reinforces what they did in the workshop or they receive online support. This three-phased approach provides more "windows of opportunity" for the teacher to actively process information (Doolittle, 2014).
2. **Online Courses/In-person Teacher Practicum.** This is common in open and online universities where pre-service teacher candidates may be pursuing a bachelor's degree in education. Pre-service candidates take all coursework online, but their teaching practicum is in-person in a brick-and-mortar school.

### 5.5.2 Examples of Teacher-Focused Blended Learning

Blended learning is expanding as an alternative to purely online or in-person learning for teacher education. For example, Jesuit World Learning (JWL) combines online learning with in-class meetings that take place in local learning centers for teachers in marginalized areas. The on-site learning phases constitute a smaller part of the whole learning experience vis-à-vis the online learning phases (Mayr & Oppl, 2022). A qualitative study involving 80 learners from refugee camps in Afghanistan, Guyana, India, Iraq, Kenya, Malawi, Myanmar, Philippines, Sri Lanka, and Thailand suggests that they valued both the in-person and online interactions, noting that they were "suitable" for providing higher education opportunities for "learners in marginalized regions" (Mayr & Oppl, 2022, p. 3).

*ProFuturo* is a Spanish digital education program that promotes technology integration to support innovative instructional practices. It employs a blended teacher professional development program in 40 countries with a network of 1.2 million teachers. In addition to using in-person and online approaches, *ProFuturo*'s blended learning model involves an online component for schools with Internet access and a computer-aided instruction (CAI) model for schools without Internet access (C. Gallego Garcia, V. Cruz Gomes, A. Sánchez Rodríguez, personal communication, November 24, 2022).

In a study of *ProFuturo*'s blended approach, in Luanda, Angola, researchers employed a randomized field experiment to assess its impact on 42 primary schools. Twenty-one schools were randomized to receive this blended approach in the beginning of 2018 and another 21 in 2019. The evaluation reported a number of successful teacher-related outcomes associated with the approach. These included increased familiarity

[5] For practical information on flipped instruction, visit Martha Ramirez's site on designing flipped lessons: https://martharamirez.com.co/blog/designing-flipped-instructions-for-differentiation/

with and increased use of technology for both teachers and students, increases in teachers' motivation, and reduction in teacher absenteeism. Results should be interpreted in light of the fact that school principals selected the teachers from their school to participate in this study, based on their motivation, technological skills, and availability (Cardim et al., 2021).

### 5.5.3 Research: Blended Learning for Teacher Education

Most of studies on blended learning examine general university courses, not teacher education programs. Not surprisingly, however, empirical studies have both supported blended learning or found no superiority to in-person learning. For instance, Escueta et al. (2021) reported on two experiments examining blended learning environments at a U.S. university. One compared outcomes for a statistics course in which one group of learners received three hours per week of face-to-face instruction time, while another group received only one hour of instruction time but additional Internet-based exercises. The second experiment evaluated the effects of reducing face-to-face time in an economics course where all students also had access to online resources. Neither experiment found significantly better outcomes associated with more in-person class time in a blended learning context (Escueta et al., 2021, pp. 930–931).

A U.S Department of Education meta-analysis (Means et al., 2009) found that instruction that combines both face-to-face and online learning elements produced a greater impact than did instruction using only one or the other of these modes. Positive effects for online learning outcomes were stronger when contrasting blended online courses with face-to-face courses versus fully online courses to face-to-face courses. The study's authors note that the observed advantage for blended learning conditions is not necessarily rooted in the media used *per se*, but rather is reflective of differences in content, pedagogy, and learning time.

A further review of experimental and quasi-experimental studies that contrasted different types of online learning practices found that in studies examining blended versus purely online conditions, student learning was usually comparable across both (Means et al., 2009). These results are in keeping with an earlier meta-analysis which found that blended learning may actually provide a qualitatively superior form of professional development than either online or face-to-face learning alone (Zhao et al., 2005).

In one of the most rigorous studies on blended learning, Alpert et al. (2016) tested the impact of an undergraduate economics course of two treatment arms—one purely online and one blended—along with a fully face-to-face control group in a single experimental context. Using an experimental design, researchers randomly assigned learners to one of three delivery modalities: classroom instruction; blended instruction with some online content and reduced instructor contact; and purely online instruction. The authors found that learners in the purely online version of the course did not perform as well as those in the in-person group (learning outcomes were 5 to 10 points lower on a cumulative final exam), while outcomes for the blended treatment group, although not statistically significant from the control group, had outcomes that appeared equivalent to learners in the face-to-face course (Alpert et al., 2016).

A final set of information comes from EDC's online coaching/one-computer pilot program in Indonesia (2008–2010) as part of the USAID-funded Decentralizing Basic Education 2 project. The coaching program had two goals: One was to help teachers integrate one computer in learner-centered ways with 40 students. The second was to build a teacher support system by developing a cohort of highly skilled school-based coaches.

In this approach, Indonesian coaching candidates (former teachers, master trainers, and content area supervisors) received two weeks of face-to-face instruction in coaching techniques—for example, conducting classroom observations and inter-rater reliability testing on classroom observation instruments in actual classrooms. Following the in-person orientation, they participated in a 10-session, 21-week online learning course, *Strategies and Techniques of School-based Coaching*, in which the coaching candidate learned a particular strategy online and, together with his/her school-based coaching partner, applied this coaching technique with teachers. Examples include holding productive meetings, helping teachers design a lesson plan, co-teaching a one-computer classroom activity with teachers, and observing and providing feedback to teachers. To determine which model of online learning best suited the continued development of *coaching* skills, coaching candidates also received ongoing support from a mentor—either fully online, blended, or in-person—as part of their coaching formation.

To determine which model of distance learning best suited the development of *teachers' integration of technology*, EDC created three models of coaching: a purely online version (100% of instruction and support online), a blended version (50% of instruction and support online and 50% in person), and a 100% in-person version.[6] Teachers were not randomly assigned to one of the three groups; rather, schools were assigned to each group based on the availability and robustness of the school's Internet. Thus, the results discussed below are not generalizable (Burns, 2013).

These two aspects of the program were evaluated —coaching skills and teaching skills.

EDC's published and unpublished internal data showed that teachers in the *in-person* coaching version performed better than their colleagues in either the hybrid or online program on the following measures: collaboration with colleagues, lesson design, and learner-centered instructional practices. Teachers who received blended coaching scored higher on constructs measuring relationships with students and in their ability to use technology. All results were significant at $p > 0.05$. All teachers in the fully online coaching arm had lower scores on all measures than both their blended and in-person counterparts.

*Coaches* who received either in-person or blended mentoring and provided both in-person and blended coaching to teachers scored higher on measures of the "coaching process" (a set of behaviors related to coaching), instructional methods, and instructional design skills than did coaches who received fully online mentoring. These "blended" and "in-person" coaches saw consistent improvements in their understanding of teacher capacity-building and their ability to support teachers. Like teachers who received online coaching, the online coaches themselves showed the lowest gains in measures of coaching efficacy—in some cases regressing—even though they started at a higher base level. This suggests that both blended and in-person models were successful in imparting key learning objectives related to instructional coaching.[7]

What the above results appear to show is that in-person learning has an important role to play in online and, indeed, in all forms of distance education. Put another way, interventions *without* some degree of face-to-face teaching may result in poorer learning outcomes or a less satisfactory learning experience. But importantly, while far more rigorous evidence is needed, it does suggest that switching courses from fully in-person to blended might decrease costs without negatively affecting quality (Escueta et al., 2020, p. 931).

We now move to a focus on formal online learning.

[6] Because it involved text-based communication and email, it was referred to as "Web-facilitated" versus "in person" in the original design.
[7] This is based on unpublished raw data.

## 5.6 Online Courses: Synchronous, Asynchronous, and Bichronous

Online learning is highly platform-driven, and the ways teaching and learning occur online is inexorably linked to its model of delivery (Commonwealth of Learning, 2008). The architecture of the platform defines the type of learning and communication—whether, as Figure 5.1 discusses, learning and communication are asynchronous, synchronous, or both ("bichronous").

As a result of this, online learning has been typically segmented into two overall learning "types" or pathways—synchronous or asynchronous courses—which differ by communication tools, feedback types, input methods, collaboration modes, and the skills targeted (Xie et al., 2018). A third variation—bichronous learning (Martin et al., 2020b)—combines traits of both synchronous and asynchronous learning. As seen below, these online learning types are largely platform dependent; thus, to understand the type of learning, it is also important to understand the platform.

This section examines online learning as formal online courses. Before doing so, two caveats frame its organization. First, despite sharing several defined characteristics, synchronous and asynchronous courses are not uniform environments but offer a variety of different options for teaching and learning (Fabriz et al., 2021). Second, though platforms lend themselves to synchronous or asynchronous learning and communication, this is not a hard and fast rule. Though it's logistically challenging, for example, a MOOC platform can support some degree of synchronocity (learners engaging ina simultaneous discussion). Similarly, a tool like social media, which is often considered synchronous, may be used in both a synchronous or asynchronous fashion. Thus the degree of synchronocity or asynchronocity of an online learning platform is often, though not always, defined by intent and design.

### 5.6.1 Synchronous Learning

As the COVID-19 pandemic shuttered schools and universities across the globe in 2020, education and learning shifted to online or *Zoom* classes—synchronous online learning via a video conferencing platform or two-way video. Before COVID-19, fewer than 44% of public two-year, 55% of public four-year, and 50% of private four-year universities in the U.S. reported having a video conferencing platform in place. By 2021, those figures jumped to 84%, 88%, and 86%, respectively (Garrett et al., 2021, p. 31). The degree to which video conferencing moved from a peripheral distance education tool to a mainstream one in less than 12 months emphasizes the importance of synchronous learning in managing the learning crisis spawned by COVID-19 pandemic school lockdowns.

#### Webinars/Web conferencing platforms

The cornerstone of synchronous online learning is the *Webinar.* Also known as virtual seminars, online conferences, live meetings, Web meetings, live classes, or *Zoom* classes—webinars use a Web conferencing (sometimes called "Web seminar" or "two-way video") platform. These platforms allow for real-time professional development with an instructor and a group of teachers, thus simulating an in-person professional development session or actual classroom. Through the use of breakout rooms, "raising hands," polling software, integrated group video, audio, instant messaging (chat), screen sharing, whiteboards, document sharing, and the use of third-party apps (such as *Answer Garden*, *Padlet*, or *IdeazBoard*), Web conferencing platforms can facilitate real-time interaction between an instructor and small groups of learners. These same platforms also can be used to facilitate teacher learning communities or classroom observations. Every webinar platform requires a "host," who sets up the webinar and invites attendees through a URL or code.

Webinars,[8] or live online classes, can be part of an ongoing program of online professional development, a prerequisite to formal professional development, or the entire professional development itself. As an example of the latter, from 2020–2022, Education Development Center and Florida State University provided 33 *Zoom*-based workshops to over 900 Lebanese university instructors as part of USAID's Higher Education Capacity Development program. The webinars focused on helping instructors deliver EDC's *Work Ready Now* curriculum to university students; develop skills to effectively teach online; and strengthen the capacity of higher education institutions in Lebanon to design effective synchronous online courses (N. Chervin, personal communication, October 11, 2022).

*Webcasts*, often erroneously conflated with webinars, also are known as "Web broadcasts" or "one-way video conferencing." They are media presentations, often live or on-demand, presented over the Internet using streaming media technology to distribute a single content source to many simultaneous viewers. Webcasts have a longer tradition in distance learning because of their scale and convenience. Learners can access a webcast of a prerecorded webinar or live lecture via *YouTube* or storage sites such as *Box* or *OneDrive* for later viewing at their convenience. Webcasts, as well as screencasts, a subset of webcasts,[9] have become foundational to blended learning, particularly, flipped learning, as discussed earlier.

Thus, unlike webinars, which theoretically are interactive and involve two-way communication, webcasts use one-way communication (presenter-audience). Like all forms of broadcast, they tend toward didactic and passive learning. As Chapter 3 discussed, research with teachers and university students suggests that webcasts or screencasts, like all video, have unique affordances as a learning tool. Learners can watch and rewatch a lecture at their convenience, particularly before examinations, and evidence suggests that students respond better to the multichannel nature of a screencast (audio, visual, and closed-captioned text, where available) than they do to live lectures (Green et al., 2012).

Synchronous online classes via Web conferencing platforms have had several unexpected ramifications for education in general, such as an increase in home learning and micro-schools (Crawford, 2021). They also have had significant implications for teacher learning. First, they've mainstreamed live, "face-based," cohort-based online learning for educators. This has the double-edged effect of increasing access to learning opportunities that might otherwise be unavailable while at the same time shifting in-person learning, coaching, and mentoring—which many teachers generally prefer and consider as higher quality—to a virtual environment (Burns, in press).

Critics have argued that hour-long synchronous lectures foster learner passivity, while proponents maintain that properly planned synchronous activities increase learner engagement. Both of these statements are true and point to the second consequence of synchronous learning—more than any other type of online learning,

[8] This is where the technical and vernacular meanings of technology collide and blur. Educational institutions often host large meetings through *Zoom* or *WebEx*, which transmit information to a large, dispersed audience; they may mute all participants, disable the chat, Q&A, and hand-raising features, and essentially minimize interaction. Readers may have experienced this and heard the term "webinar mode" used. This guide considers such a practice to be a webcast, versus a webinar, though that distinction is not shared by all institutions or Web conferencing providers. See for example, the University of Michigan's Information and Technology Services: https://tinyurl.com/c5afmtt3

[9] "Screencasts" or "video screen capture" are digital recordings of an event that occurs on a computer screen. They typically contain audio narration and are oftentimes "how-to" videos. Despite this distinction with webcasts, the two terms are frequently conflated. For more information on screencasts, see *Appendix 2: Glossary*.

synchronous learning has forced online instructors to pay attention to design and delivery of learning. The result has been the increasing use of online pedagogies that transcend the classic explanatory and didactic pedagogies used in asynchronous modes of learning toward instructional methods that are more collaborative, exploratory, and active. It is not without substantial effort, and even embarrassment at times, to adopt such approaches in an online environment (as anyone who has struggled to get their learners into a breakout room knows), yet many online instructors have successfully adopted more interactive instructional strategies for Web conferencing platforms, such as *Meet, Zoom,* or *Teams.* These range from simple techniques such as Think/Pair Share, chat storms, visible thinking routines,[10] small-group discussions, and carousel walks to collaborative team-based activities and project-based learning (Burns, 2020b).

Third, synchronous learning has turbocharged hybrid learning, which, as Figure 5.1 explains, is a form of instructional delivery. In a hybrid approach, some learners attend in-person classes while others simultaneously attend the same class via a Web conferencing platform. Hybrid learning expanded during the 2020 COVID-19 pandemic when educational institutions across the globe used this approach to create enough space for social distancing or to allow quarantined students to still attend classes. It also was used to allow international students, who could not travel due to COVID-19 travel bans, to attend their university classes in another country. This shift to hybrid learning has increased access to professional learning for teachers and spurred experimentation with other synchronous technologies like holographic technologies (Burroughs, 2021).

Hybrid learning, though extremely flexible, is particularly challenging instructionally.[11] While it provides greater choice and convenience to learners, instructors must simultaneously instruct learners both in-modalities. This can frustrate online learners who may feel neglected as the remote instructor focuses more on her in-person learners and it can frustrate in-class learners who must contend with the break in flow caused by video lags and bandwidth interruptions. Hybrid learning also necessitates substantial investments in audiovisual technologies that ensure that online learners are seen, heard, and do not feel like second-class citizens. It requires greater attention to lighting, to video that is supported by high-quality audio to capture class interactions and discussions, to shifts in the architecture of audiovisual systems, and to sufficient microphones, acoustic treatments to reduce ambient noise, larger, higher-quality screens, and voice-tracking cameras that follow the speaker.

Finally, thanks largely to synchronous classes during emergency remote learning, teachers of all ages across the globe have burnished their technology skills. They are more comfortable and more skilled in using and teaching with technology than they were before the pandemic (Burns, in press; Pota, et al., 2021).

### Virtual classes

Online classes are traditional online options for pre-service and in-service teachers. A variation on this and a second model of synchronous online learning involve *virtual classes*. Virtual classes[12] are primarily a U.S-based phenomenon, though that will surely change. They leverage the Internet to provide access to courses for students in rural areas who typically lack qualified teachers in certain subjects, such as algebra. There are

[10] See these examples from Catlin Tucker: https://catlintucker.com/2020/09/online-learning-thinking-routines/

[11] It is even more challenging for one variation of hybrid learning— "HyFlex" learning—where learners have full control of their modality (face-to-face, online synchronous, or online asynchronous) and decide the activities and time that they will participate online or in-person.

[12] Though this may not be true in practice, virtual classes for the purposes of this guide are distinct from *virtual schools*, which, as discussed in Chapter 13, are mainly online schools for secondary students.

a number of such classes in rural parts of North Carolina, Vermont, Maine, and Louisiana.

Yet, though primarily concerned with delivering curriculum and instruction to *students*, virtual classes in many cases also are focused on the professional development for the *in-class teacher.* The best-known example is the Louisiana Algebra 1 Online project (U.S.), initiated in the 2004–2005 school year[13] to provide online Algebra 1 courses to students in rural Louisiana who lacked a qualified Algebra 1 teacher. Students interacted with the online teacher—who was certified in algebra and thus the teacher of record—primarily through the LMS *Blackboard* and email. As with instructional television, discussed in Chapter 3, students were monitored in class by a teacher who was *not* certified in mathematics. In state-level exams, the online Algebra 1 students performed as well or better than their peers in face-to-face Algebra 1 classes (O'Dwyer et al., 2007).

However, like Portugal's *Telescola* initiative, discussed in Chapter 3, the program also focused on upgrading the skills and qualifications of the in-class teacher. In addition to instructing students, the online teacher coordinated lessons with and provided guidance to the in-class teacher throughout the year, so that the in-class teacher could provide help to students as needed. The state education agency of Louisiana provided professional development to both the online teacher and the in-class teacher and both met for two days during the summer in a face-to-face workshop to plan communication, materials, and instruction. Throughout the school year, the two teachers communicated daily via email and phone calls. Thus, the in-class teacher received pedagogy training and mentoring that helped build his or her capacity for high-quality instruction.

Interviews with teachers and classroom observations[14] suggest that the online Algebra 1 classes improved in-class teachers' content knowledge and instructional practices and helped to support uncertified teachers' efforts toward mathematics certification (O'Dwyer et al., 2007). Like other forms of distance education (such as interactive audio instruction, discussed in Chapter 2), the Louisiana Virtual Algebra 1 Online serves as an example of just-in-time in-class professional development that educates *teachers* as it educates students.

There are few examples of virtual classes outside the U.S. One example, discussed in Chapter 3—*eSgoil*—provides education to learners in remote, sparsely populated western islands of Scotland using live video streaming and other digital tools available through Scotland's national digital platform, *Glow*. In such locations, teachers often also lack qualifications or have limited opportunities for ongoing professional development, though it is unclear the degree to which *eSgoil* classes are also directed toward improving the in-class teachers' knowledge and skills (Kizuka, 2019).

### Summary: Synchronous learning

Research on synchronous learning—primarily synchronous classes via a Web conferencing platform—is scant, though the field is increasingly populated by findings on synchronous remote learning during COVID-19 pandemic school lockdowns and gradual re-openings. As universities and teacher professional development programs continue to employ synchronous learning as a major form of online learning, more empirical research should hopefully follow.

Yet the remote learning of COVID-19 pandemic school lockdowns—in wealthy countries, at least—involved live online classes with primary and

[13] It is not clear when this particular state-funded program ended. There are other virtual algebra courses in Louisiana offered by private online providers, but they appear to be solely focused on students as opposed to students *and* teachers.

[14] The author conducted interviews with and classroom observations of in-class teachers as part of this evaluation.

(mainly) secondary and tertiary students,[15] thus furnishing a real-time global study on the learning impacts of synchronous learning in particular and online learning in general. If we follow the data, then synchronous learning was a failure, as corroborated by plummeting test scores and "learning loss" across the globe (Annual Status of Education Report, 2021; Asian Development Bank, 2022; Garrett et al., 2021; National Center for Education Statistics, 2022).

However, while the above is true, it may not be a fair representation of online learning. As Hodges et al. (2020) note, a "temporary shift of instructional delivery to an alternate delivery mode due to crisis circumstances" cannot be accurately compared to carefully planned, purposeful online learning. Detailed planning, multiple inputs, opportunities for collaboration and discussion, and iterative design, as Section II of this guide advocates, is critical for a successful synchronous online course. Additionally, *Zoom* classes and remote learning were entangled with too many other confounding variables—the pandemic itself, the health-related and emotional trauma of the morbidity and mortality associated with COVID-19, the panic that accompanied the lunge to remote learning, the need for schools to get an online system up and running, and poor technical infrastructure.

Because synchronous learning via Web conferencing platforms as a major form of online learning is so new, evidence-based data for impacts on *teachers* are particularly hard to come by. A single-group quasi-experimental study with 26 pre-service math teachers in China, using a pre-test and post-test design, showed an increase of 11–15 points in the distribution of total scores following synchronous classes (Jiang & Jiang, 2022).

Figure 5.4 presents findings on the benefits and limitations of synchronous online learning. These findings are not without ambiguity and contradiction. For instance, constant opportunities for contact with instructors and classmates is often cited as critical in online learning success (Berry, 2017; Gray & DiLoreto, 2016; Rizvi et al., 2020; Santally, 2016). Yet, Means et al. (2009) report that within cohort-based synchronous courses, while these support mechanisms may generally influence the way students interact, they do *not* affect how much they learn (p. xvi). Based on findings from a study in a regional Australian university, Nieuwoudt (2020) found that student achievement was *not* affected, whether students attended synchronous virtual classes or watched the recordings of the virtual classes though this finding is not without ambiguity (cf. Fabriz et al., 2021; Malkin et al., 2018).

### 5.6.2 Asynchronous Learning

As Figure 5.1 outlines, asynchronous learning is temporally and geographically independent. It tends to be more individually based and self-paced, and less instructor-dependent, than synchronous courses (Fabriz et al., 2021). For these reasons, asynchronous online learning is a common form of teacher professional development across the globe. It often consists of individual, discrete courses that may offer some interaction with an online instructor and less—or no—interaction with online classmates. Asynchronous learning may be either full-time or supplementary programs directed toward an advanced degree or promotion or taken for continuing education credit or even enrichment. For example, the Cyber Teacher Training Center in South Korea offers self-directed, self-paced, online courses for primary and secondary school teachers. Online tutorials also are offered, with some courses requiring occasional face-to-face meetings (Latchem & Jung, 2010).

While there are multiple examples of asynchronous online learning—online courses, mini-courses, *YouTube* videos, teachers reading online journals and blogs—this section focuses exclusively on

[15] Early childhood classes were not involved, however. This was perhaps the student cohort most adversely affected by COVID-19 pandemic school closures.

**Figure 5.4**
**Benefits and Limitations of Synchronous Online Learning**

| Benefits | Limitations |
|---|---|
| • **Greater motivation.** Learners characterize participation in online synchronous discussions as more focused, more motivating, ultimately resulting in better course performance than in asynchronous discussions (Malkin et al., 2018).<br>• **More positive learning experience.** Learners report a more positive learning experience plus greater support of their basic psychological needs. This includes findings of less procrastination and greater relatedness and learning gains which enhance the overall learning experience and are inked to a higher acceptance of online learning (Fabriz et al., 2021, p. 11).<br>• **Higher completion rates.** Learners are more likely to stay up to date with their assignments, interact more with their peers, report greater engagement in the class, and more likely to complete their course than are learners in asynchronous courses. This is particularly true for traditionally underrepresented learners (McCormick, 2018).<br>• **More interactive teaching methods.** This includes whole group work, discussions, and breakout room discussions that increase opportunities for dialogue and support learner-learner interaction (Malkin et al., 2018). This has been shown to result in significantly higher gains in procedural and social skills, and in learner interest in the disciplinary content (Blau et al., 2017; Burns, 2020b; Fabriz et al., 2021, p. 10).<br>• **Lower transactional distance costs.** Moore (2013) defines transactional distance as the geographic and communication distance-related factors that must be overcome for learning to occur. While some transactional distance occurs in all types of online learning, it occurs less so in synchronous courses because of real-time interpersonal communication, the use of natural language, and immediate feedback (Blau et al., 2017; Fabriz et al., 2021; Moore, 2013).<br>• **Ability to modify and personalize instruction.** While synchronous and asynchronous courses both can change and personalize instruction in response to student needs, synchronous instruction makes this more instantaneous, as instructors can observe and hear directly from learners what they need to have changed and can modify instruction accordingly. | • **Decreased fluency of interaction.** Videoconferencing decreases the fluency of interaction, making interactions slower and attention lower compared to traditional teaching (Rapanta et al., 2020).<br>• **Less flexibility and autonomy.** Because they often are cohort-based, dialogue-focused and may be less structured, synchronous courses demonstrate less of the "any time, any place, any pace" affordances of asynchronous ones.<br>• **More bandwidth intensive.** Synchronous courses require better technical infrastructure to allow for live participation in remote settings.<br>• **Greater psychological toll on learners.** Collectively known as *Zoom fatigue*, conditions such as *mirror anxiety* (which can be triggered by the self-view in video conferences that acts as an omnipresent mirror during social interactions) and *hyper gaze* (perceptual experience of constantly having peoples' eyes in your field of view), both separately and cumulatively, take a psychological toll on learners. Daily participation in synchronous classes predicts these conditions and can result in increased cognitive load, negative affect, including anxiety and depression—conditions that are more likely to impact female, versus male, learners. *Zoom* fatigue is exacerbated when educational institutions and distance education providers struggle with camera policies. (Fauville et al., 2021).<br>• **Physical and ergonomic issues.** Restricted physical movements in synchronous classes (because of the impropriety of getting up and walking around during a live class), ergonomic issues, eye strain, lower lumbar, neck and shoulder pain have all been associated with *Zoom* classes (Fauville et al., 2021). |

a well-known form of asynchronous learning—Massive Open Online Courses (MOOCs).

### Massive Open Online Courses

Massive Open Online Courses are what their name suggests. They are *online courses* that are *massive*—allowing hundreds, thousands, or even tens of thousands of learners to enroll. They are *open* to any learners, regardless of qualifications or abilities. As of 2021, MOOCs reached 220 million learners globally (excluding China)[16] through 3,100 full courses and 500 micro-credential courses. MOOC provider *Coursera* alone added 21 million new learners in 2021 (Shah, 2021, pp. 1–2).

MOOCs began as a media phenomenon—a "techno-determinist" solution to global educational inequities in the words of some (Weingarten, 2014, p. 1). They promised a high-quality education from the world's best universities for the world's poorest people for free, a pledge that threatened to upset the existing higher education model (Friedman, 2012). Between 2012 and 2015, MOOCs experienced enrollment rates exceeding 25 million (Kizilcec et al., 2017). However, as will be discussed below, as MOOCs evolved, they began to markedly diverge from their origin story. Now MOOCs are mostly known for their huge numbers of learners, for their equally prodigious dropout rates, and for a promise-breaking business model. Consequently, they have been largely bypassed as vehicles for teacher professional development.

MOOCs contain the same set of activities as regular LMS-based online courses—sequenced video-based lectures, readings, problem sets, some form of online (typically closed response) assessments, and a discussion forum. There are essentially three different types of MOOCs.

- **Connectivist MOOCs or cMOOCs** incorporate collaboration and focus on participants building content and connections with other participants. Learning is student-centered, and participants' discussions and interactions are considered to be critical to the course (Amado et al., 2022). They also are sometimes referred to as "constructivist MOOCs."[17]
- **Extended MOOCs or xMOOCs** are similar to the classic pedagogical model used in traditional online university courses, which focuses on content delivery for participants (Amado et al., 2022).
- **Nano-MOOCS or NOOCs** are micro-courses or "nano-courses. Users can achieve a targeted set of competencies in a short amount of time. They often are accompanied by a nano-credential or a micro-credential certifying completion of the course (Basantes-Andrade et al., 2020; Pérez Sánchez et al., 2017).

Because many MOOCs are still free, several studies have pointed to the potential of MOOCs as relevant vehicles for teacher professional learning, promoting new skills and professional improvement, especially for teachers of disadvantaged students (Basantes-Andrade et al., 2020; Castaño-Muñoz et al., 2018; Hertz et al, 2020; Laurillard, 2016; Zhao et al., 2018).

### MOOCs for teacher professional development

Despite their relatively small footprint in teacher professional development, there is evidence that teachers, like the population at large, participate in MOOCs for a wide variety of reasons—from practicing skills for school or work to fun and personal interest. In Spain, 81% of teachers participating in the Spanish Ministry of Education's National Institute for Educational Technology and Teacher Education (INTEF) MOOCs, reported participation in a previous MOOC, with 42% completing it (Castaño-Muñoz et al., 2018). Seaton et al. (2014) reported that of 11 MIT MOOC courses (MITx) offered through the course provider *edX* in spring 2014, approximately 36% of course participants identified themselves

[16] This is due to a lack of reliable data.

[17] See *Appendix 2: Glossary* for an explanation of connectivism, constructivsim, and social constructivism.

as teachers. Because many MOOCs are affiliated with universities, they may play a role in pre-service teacher education. However, unlike conventional online courses, MOOCs usually are not part of official degree programs.

There are MOOCs designed specifically for teachers. In Jordan, Edraak ("Realization") is an Arabic-language MOOC platform implemented by the Queen Rania Foundation (Queen Rania Foundation, n.d.).

Spain's INTEF program offers MOOCs (both traditional and nano-MOOCs) to help teachers utilize ICTs to improve teaching and learning. Of the 11,566 teachers participating in the traditional teacher training MOOC and the 3,653 teachers participating in the NOOC version of the course, 57% and 55%, respectively, completed each type of MOOC course (Castaño-Muñoz et al., 2018). Enrollment and completion rates suggest this was a self-selected, rather than representative, group; nonetheless, such high completion rates are encouraging.

Europass Teacher Academy, Europe's largest provider of online professional development for teachers, offers MOOCs among its online offerings for teachers in Europe and across the globe. A core feature of all Teacher Academy courses is that they require participants to transfer their learning into a concrete course output, such as a lesson plan, which allows for easy implementation in their own classroom or school (Europass Teacher Academy, 2022; Hertz et al., 2020, pp. 231–232). In the United States, the Friday Institute for Educational Innovation at the North Carolina State College of Education offers free "MOOC-Ed" (MOOCs for Educators) courses focused on project-based learning, collaboration, and peer-supported learning (Friday Institute, n.d.).

Teacher Education in Sub-Saharan Africa (TESSA) has offered at least two MOOCs, primarily directed at educators in Sub-Saharan Africa and India. One, *Making Teacher Education Relevant for 21st Century Africa* was designed to support Sub-Saharan teacher educators in changing their practice and better support teachers in the new curricula being developed. It focused on active teaching approaches, incorporating ICT into classroom learning and using TESSA's Open Educational Resources (OER), and provided teachers with the opportunity to develop collaborative networks. Approximately 4,444 southern African educators joined the first two versions of this MOOC and over 7,000 educators in all have participated in it, many accessing it via their phones. For many, this was their first experience with online learning (Stutchbury et al., 2019).

The second MOOC, offered through TESS India and entitled *Enhancing Teacher Education through OER MOOC!*, was designed to help teacher-educators become familiar with TESS-India open educational resources (OER), its pedagogic approach, and how materials could be used with teachers. After a pilot iteration, this MOOC was run in English (with approximately 10,000 participants) and then in Hindi (with approximately 30,000 participants) (Wolfenden et al., 2017, as cited in McAleavy et al., 2018).

In Latin America and the Caribbean, the Organization of American States (OAS) offered a hemisphere-wide nine-week MOOC from August–October 2015. Over 6,771 teachers from at least 22 countries[18]—the majority from Ecuador (1,473) and Colombia (1,240)—enrolled in *Pensamiento crítico: un reto del docente del siglo XXI (Critical Thinking: A Goal for the 21st Century Teacher).*[19] Fifty-three percent of enrollees were female and the average learner age was 40. The MOOC was unique in that it employed a team of tutors so teachers could get immediate

[18] 1,066 teachers did not note their country when registering for the MOOC.

[19] The author was part of the evaluation team examining outcomes of this MOOC. The information here is taken from internal documents.

feedback and communicate with a tutor as needed. Eighty-five percent rated the quality of the content “excellent” (the highest rating) and 55% rated the peer interaction as “excellent.”

The Commonwealth of Learning (COL) *Teacher Network for Girls Education* project (also known as TEN-G) supports teacher mentors in marginalized communities to adapt COL MOOCs and other Open Educational Resources (OER) training materials for female teachers through on-site training and other blended learning opportunities. Teachers develop podcasts that are subsequently aired to learners via local radio stations, as well as adapting and sharing other existing OER in their teacher communities (Traxler & Ogange, 2021, p. 7).

While not directed at teachers *per se,* Kiron Open Higher Education, a non-governmental organization supporting refugees in Germany and worldwide (primarily in Jordan), offers MOOCs and other online courses to anyone worldwide with a refugee background. Kiron collaborates with well-known MOOC and online learning providers so that Kiron learners can take the online courses as well as obtain certificates of successful completion, all free of charge. Learners can accumulate up to 60 credit points in two years by completing MOOCs and other online courses. They can then use these credits, recognized in Europe by the European Credit Transfer and Accumulation System (ECTS), to transfer to one of 56 institutions of higher education with whom Kiron partners. The program also offers substantial supports to online learners—study groups, Help Desk, online counseling, online and offline language courses in German, English, and French, and online mentoring are but a few of these services (Halkic & Arnold, 2019, p. 349).

Finally, MOOC platforms, such as *Coursera, Miriadax* (for Spanish speakers), *France Université Numérique* (FUN) (for Francophones), and *edX*, despite their monetization, provide thousands of sometimes free or usually free-to-audit courses of different types and on different subjects. *Coursera* alone, as of January 2023, reported that it offers 8,213 free-to-audit MOOCs and 199 free certificate courses (Class Central, 2023). MOOC-List, a clearinghouse of free online MOOCs, also points the way to courses that would be of potential interest to many teachers. Because of the organization of MOOC-List (it lists courses by start dates in 30-day increments), the exact number of free courses is difficult to ascertain.

## Benefits of MOOCs for teacher learning

MOOCs have been a major driver of positive change in online learning.

First, by design, MOOCs have scaled educational opportunities. Via course materials, the volunteerism of MOOC learners, prerecorded lectures, and automatically graded assessments, educational opportunities have been made available to millions of learners worldwide, including teachers (Kizilcec et al., 2020; Kizilcec & Halawa, 2015). While they are increasingly directed at professional learners—those who want to take online courses that are convenient—MOOCs still offer university-level courses that come from a recognized institution, and there is evidence that learners can transfer skills learned from MOOCs into real-world settings (Kizilcec et al., 2020). As of 2022, there were over 70 online degree MOOC programs and some 17,000 micro credentials—some portion of which undoubtedly include teachers (Shah, 2021).

Next, MOOCs also are well-suited to assess the scalability of behavioral interventions. They have a well-defined outcome (course completion) requiring sustained effort, and learner progress is continuously tracked through a common software platform and through automatic assessments (Kizilcec et al., 2020, p. 14,900). Thus, online learning providers could potentially use MOOCs to develop and assess a number of online learning innovations to see what works best and under what conditions.

Third, MOOCs have increased the online learning design IQ of many educators who had never before seen an online course, and who, thanks to the ability to access free MOOCs, witnessed for the first time the possibilities of online learning. Before MOOCs, a good deal of online learning often suffered from the "old wine in new skins" syndrome—flat, highly text-based content delivered via new technology. In part, this may have been because online learning was a private learning experience, "hidden" behind the walled garden of an organization's LMS so that instructors and designers saw little beyond what they themselves created and learners had no points of comparison by which to evaluate their course design and structure (Burns, 2021).

The first batch of MOOCs was produced by university consortia (for example, *Coursera*) that had access to high-quality production teams, studios, and content. For the first time, many potential online learners and instructors could see carefully designed online courses complete with video, clean interfaces, rich media, automatic grading features, and interactive exercises. Many LMS designers began appropriating some of the best design features of MOOCs for their LMS, and indeed many LMSs have adopted features of MOOC design (Burns, 2021). These design features—platforms with simple accessibility, a clear structure and sequence of the online content, high-quality video—influence the learning experience, and interviews with teachers suggest that they appreciate what many considered the innovative design of MOOC platforms (Burns, 2021; Castaño-Muñoz et al., 2018; Pérez Sánchez et al., 2017).

Fourth, MOOCs did, and still do, continue to provide *à la carte* online learning to those who would be unable to access it through face-to-face means (Burns, 2021). While attrition rates are high for MOOCs, high attrition in and of itself is not a problem if learners get what they need from the course (Escueta et al., 2020; Kizilcec et al., 2020). (They are a problem if learners are supposed to complete the course and if their work is collaboration-dependent.) Many learners in a typical MOOC stop participating because they have learned all they intended to learn. This finding resonates with prior work on attrition in community colleges, where attrition has been interpreted as a sign of success and where progress in a course and learner satisfaction are only weakly related (Kizilcec & Halawa, 2015, p. 5).

Finally, since many MOOCs are affiliated with universities and university consortia, there is a fair amount of foundational research on MOOCs for university learners (which may include pre-service teachers). Many of the most well-known MOOCs are and were affiliated with consortia of large research-based institutions, thus these same entities are responsible for a good deal of the actual experimental studies on the effectiveness, or lack thereof, of MOOCs. This has helped the online education field as a whole (Burns, 2021).

### Limitations of MOOCs for teacher learning

Despite their strengths as a tool for teacher learning, MOOCs have several limitations as a distance education tool.

First, though there is research on MOOCs, very little of it systematically analyzes the characteristics of teachers participating in MOOCs or focuses on their perspectives of their MOOC-based professional development. Thus, it is difficult to determine the exact impact of MOOCs on teacher learning (Castaño-Muñoz et al., 2018; Laurillard, 2016). Only a few studies are available to date, and most of the available literature reports only on the design of a single MOOC for teachers. Further, the overall impact on MOOCs' learning outcomes for teachers is difficult to evaluate. Where there *is* experimental research, it has focused largely on issues of completion and on whether and how a range of behavioral interventions can improve MOOC completion rates and extend coverage to disadvantaged groups—for example, by increasing interest, effort, and persistence (Escueta et al., 2020, p. 939).

MOOCs have a third problem in determining their effectiveness. Since they generally do not substitute for face-to-face courses that pre-service and in-service teachers would otherwise take, they lack a "clear counterfactual" (Escueta et al., 2020, p. 938). Thus, since they have no single function, no specific role they seek to fulfill, and no institution they attempt to replace, there is no clear experimental evidence on their overall affect (Escueta et al., 2020). This absence of hard data has contributed to much of the criticism about MOOCs.

Fourth, the whole concept of MOOCs contains the seeds of their own demise. The massiveness of MOOCs has real drawbacks in terms of quality online learning—depersonalization and a lack of focus on instruction. Though MOOCs have "discussion" forums, they do not mimic small-group discussions in face-to-face, or synchronous, or even LMS-based classes, where students can get to know each other, exchange questions and concerns, and speak with the professor or a teaching assistant. Instead, they often serve as help forums or places for questions and answers (Krause, 2014, p. 2; Laurillard, 2016). Because courses are so open, temporal, and flexible, many of those who enroll in MOOCs have no intention of participating, and those who start with good intentions still may drop out because there are no costs or consequences for quitting (Escueta et al., 2020; Kizilcec et al., 2020; Krause, 2014). As Krause notes, being able to "study anywhere, anytime" can easily result in "studying nowhere, no time at all" (Krause, 2014, p. 3).

This leads to a fifth, and more serious, allegation against MOOCs—their low completion rates, often in single digits (Escueta et al., 2020; Halkic & Arnold, 2019; Kizilcec et al., 2020; Laurillard, 2016). As Kizilcec & Halawa's (2015) examination of 67,000 online learners in 21 MIT MOOC courses reveals, this low completion—or high attrition—rate falls disproprtionately on more traditionally underserved groups, such as female learners and those in low-resource contexts.

These initial findings are corroborated by more recent research. Kizilcec et al.'s (2020) examination of 269,169 learners from all countries across 247 Harvard, MIT, and Stanford MOOCs noted that learners in the Global South were less successful in course completion. An earlier study by the same lead author found that MOOC learners in Africa, Asia, and Latin America scored substantially lower grades and were only half as likely to complete their courses than were learners in Europe, Oceania, and North America. Women also exhibited lower persistence and performance than did men (Kizilcec & Halawa, 2015).

There are data refuting such high attrition rates. TESS India's *Enhancing Teacher Education Through OER MOOC!* reported a completion rate of approximately 50% across two iterations of the course (Wolfenden et al., 2017, as cited in McAleavy et al., 2018). Stutchbury et al. (2019) reported relatively high completion rates across the two iterations of *Making Teacher Education Relevant for 21st Century Africa* (37%), and 39% of teachers completed all six modules in the OAS's MOOC *Critical Thinking, A Goal for the 21st Century Teacher*.

Further, as noted in the discussion on MOOC benefits, certain researchers caution against characterizing attrition as success or failure, noting that high attrition rates are not necessarily bad nor *ipso facto* signal a problem (Escueta et al., 2020; Kizilcec & Halawa, 2015). Many students enroll with no intention of completing the MOOC, but this doesn't make the course less useful (Escueta et al., 2020). Further, unlike traditional courses, MOOCs represent a shift from traditional online learning models, where learners must remain in a course until it is finished, to a more "user-centric" model, where learners take what they need and move on (Kizilcec & Halawa, 2015, p. 1).

Nonetheless, from an educational resource investment perspective, high attrition—or drop out—rates are troublesome and vexing. They often occur even where sufficient supports have been provided, as in Germany's Kiron initiative

(Halkic & Arnold, 2019). Low completion rates may reflect missed learning opportunities that could be avoided with modifications to the MOOC platform (Banerjee & Duflo, 2014, as cited in Escueta et al., 2020). Pérez Sánchez et al. (2017) suggest nano-MOOCs or NOOCs with micro-credentials as a more realistic option to traditional, longer MOOCs (such as xMOOCs and cMOOCs). Despite these suggestions, Kizilcec et al. (2020) found that no one intervention or set of interventions works in all contexts, concluding that further research is necessary to predict in advance what interventions will help populations of students in need (pp. 14,903–14,904).

A sixth critique of MOOCs is that they essentially represent one step forward for technology and two steps backward for instruction. Further, this poor instruction or, more accurately, the absence of instruction, has not received the attention it deserves (Laurillard, 2016). MOOC platforms are essentially built to deliver content, especially video. This, combined with large class sizes impedes interaction and collaboration. Discussion forums in MOOCs tend to be used for question-and-answer (Q&A), rather than for peer discussion (Hollands & Tirthali, 2014, as cited in Laurillard, 2016; Krause, 2014; Pérez Sánchez et al., 2017). As Chapters 14 and 15 will discuss, opportunities for peer collaboration are major factors in satisfaction with and completion of online learning experiences.

Krause (2014) suggests that MOOCs may work best not as courses *per se*, but as a type of online interactive textbook on topics that scale well and can easily be updated or as resources around a particular topic or ongoing training, akin perhaps to Purdue University's Online Writing Lab, which provides valuable writing advice and stylistic information for free, as well as a place to share writing. In both models, MOOCs could provide interested teachers with a community-based educational experience. Seaton et al. (2014) propose two more potentially valuable uses of MOOCs for teachers—encouraging teachers to use elements of the MOOC (videos, for example) for their own self-study, synchronized to their own schedules, and to enroll their students in MOOC courses and be given control over assignments and grading.

Finally, many proponents originally argued that MOOCs would benefit people from the low-income countries who lacked access to quality education (Friedman, 2012). Though MOOCs do include learners from disadvantaged groups who are formally excluded from access to higher education, they are to a large extent employed by people who already hold university degrees and study for professional development (Halkic & Arnold, 2019). There also is evidence that MOOCs are better suited to teachers with skills more amenable to success in online learning, such as high degrees of self-regulation and better digital competencies (Castaño-Muñoz et al., 2018).

MOOCs did not achieve their potential of scaling free, high-quality education to the masses. Within a decade of their launch, MOOCs have become a big business—generating over half a billion dollars annually (Shah, 2021). As this occurred, their definition of "free" changed to "free-to-audit" (Shah, 2021). Online learning consortia such as *Coursera, edX,* and *Future Learn* have been purchased, become publicly traded, or become for-profit companies offering subscription services.

Thus, while teachers in the Global South may still audit a MOOC, dreams of free Harvard degrees that accompanied the genesis of MOOCs have evaporated. MOOC companies increasingly offer certification programs for a fee, such as Micro Masters programs, and MIT has launched a MOOC-based program that will lead to a traditional master's degree. At present, however, the vast majority of free MOOCs are affiliated with non-elite universities, and the majority of new courses on platforms such as *Coursera* are developed by businesses, not universities (Shah, 2021).

**Figure 5.5:**
**Findings: Asynchronous Online Courses**

| Benefits | Limitations |
|---|---|
| • **Reports of higher test scores.** In a study of 3,056 students and 396 online instructors in a German university, learners in the asynchronous group reported higher scores, which was also confirmed by corresponding results from instructor surveys (Fabriz et al., 2021).<br>• **Flexibility and convenience.** Asynchronous courses, particularly self-paced ones, offer "any time, any place, any pace, any amount" of learning.<br>• **More media-focused and content-oriented.** Because learning is mediated primarily via content versus other learners or an instructor, asynchronous courses tend to be more content-focused. Where there are instructional methods tied to asynchronous settings, they tend to focus narrowly on facilitating student interaction with the learning materials (Fabriz et al., 2021). This narrow focus can be beneficial to many learners and instructors.<br>• **Greater autonomy.** Learners in asynchronous courses report more autonomy versus those in synchronous ones (Fabriz et al., 2021). [Since asynchronous courses require learners to exercise more autonomy, this ability to be self-directed and autonomous matters more in terms of completion (Berry, 2017; Moore, 2013)].<br>• **More useful for discussing complex ideas or deep reflection.** Cognitive achievement, such as producing meaningful and thoughtful ideas and products, can be greater in asynchronous settings (Ogbonna et al., 2019).<br>• **Greater gains in self-directed learning.** However, no differences were found in students' learning gains regarding content skills, vocational skills, and digital skills (Fabriz et al., 2021). | • **Require more careful design.** Asynchronous courses that facilitate social interaction, such as discussions in online forums, require more attention, careful strategizing, and thorough planning.<br>• **Media must be error free.** Because there may be no instructor, all activities, exercises, triggers (which allow a user to move from one presentation element to the next), and scripts (compute language that assures interactivity or shows progression in a module) must be error free. If learners encounter problems with an application, tool, quiz or presentation and there is no one to offer immediate help, they are more likely to give up.<br>• **Content and materials must be high quality and engaging.** Asynchronous courses rely on readings, videos, exercises, and animations rather than on direct personal interactions like discussions, or group presentations (Rapanta et al., 2020). This heavy emphasis on materials demands content and materials that are accurate, accessible, engaging, and adequate to learners' level of autonomy. They must operate within the overall learning design through appropriate scaffolding (Rapanta, et al. 2020).<br>• **Demand a certain skill set to succeed.** Asynchronous learning can enable learners to work in a self-paced fashion, independent of time and place (van der Keylen et al., 2020 as cited in Fabriz et al., 2021). However, it requires more self-study skills, self-regulation, and strong digital skills to successfully complete learning activities. Not all learners are equipped with the skills to benefit from asynchronous courses (Berry, 2017). In one study, half of instructors reported that most of their learners had problems self-organizing their learning at home (Fabriz et al., 2021).<br>• **Less communication and interaction with other learners.** Learning processes and educational trajectories still require socially embedded learning activities (Halkic & Arnold, 2019). When they do participate in online discussions, learners perceive such discussions as more individualistic and less cooperative than do learners in synchronous settings (Fabriz et al., 2021).<br>• **Higher attrition rates.** Attrition rates are higher in asynchronous courses, particularly MOOCs where fewer than 10% of learners on average complete their courses (Escueta et al., 2020; Kizilcec et al., 2020; Laurillard, 2016). MOOCs in particular suffer from gender and geographic achievement gaps (Kizilcec & Halawa, 2015). |

| Benefits | Limitations |
|---|---|
| • **Easier to scale.** Because they do not require simultaneous or concurrent student-teacher presence, asynchronous courses, particularly self-paced ones, are easier to scale than synchronous ones (Xie et al., 2018). | • **Greater "transactional distance."** Moore's (2013) concept of transactional distance—the geographic and communications distance-related factors that must be overcome for learning to occur—is more prevalent in asynchronous courses.<br>• **Feelings of isolation.** The lack of group-based discussions and interactions are associated with greater negative effects and a decreased sense of belonging in asynchronous courses (Peterson et al., 2018, as cited in Fabriz et al., 2021). |

### Summary: Asynchronous learning

Figure 5.5 presents findings on the benefits and limitations of all asynchronous courses including MOOCs.

Asynchronous and synchronous courses both offer benefits that learners value. Fabriz et al.'s 2021 study of 3,056 German university online learners reported that these learners valued both the quality of learner-content interaction (i.e., reading interactive texts, watching videos, and completing assignments), and learner-teacher interaction (i.e., providing feedback, providing summative and formative assessments, and documenting students' progress), and that both had a strong effect on satisfaction with learning and perceived learning (Fabriz et al., 2012, p. 3). Further supporting this view, Means et al. (2009) found that variations in the implementation of online learning did not significantly affect student learning outcomes. Their review of experimental and quasi-experimental studies contrasting different types of online learning practices found that online learning could be enhanced by giving learners control of their interactions with media and prompting learner reflection (Means et al., 2009, p. xvi).

Two additional findings are notable regarding asynchronous courses. First, direct, instant communication matters in all types of online learning. Though learners in asynchronous courses report their satisfaction with asynchronous communication tools (such as discussion forums or email communication), they also appreciate the possibility of direct instructor feedback in synchronous settings and are more likely to take advantage of online office hours with the instructor than are learners in synchronous courses (Berry, 2017; Fabriz et al., 2021). Nieuwoudt (2020) stresses that these types of interactions, and how students are engaged in the learning process, require far more investigation than is currently the case.

Finally, both Figures 5.4 and 5.5 emphasize the critical role of learners' personalities in their abilities to successfully engage and succeed in various online learning activities (Blau et al., 2017). Thus, distance learning programs should take into account the importance of tailoring online learning environments to the learner's personality and steering potential online learners to the right type of online learning (Blau et al., 2017). This can involve providing various options for learners to participate and interact online and attend virtual classes synchronously and/or asynchronously. It may also involve designing varied activities to provide online learners with multiple opportunities to communicate synchronously and/or asynchronously within and beyond the class and making available recordings of synchronous virtual classes that can be viewed asynchronously (Blau et al., 2017; Nieuwoudt, 2020, p. 15).

### 5.6.3 Bichronous Learning

As explained in Figure 5.1, bichronous learning is a learning experience that embeds both synchronous and asynchronous online elements—ideally evenly and with deliberation, though in reality this is not always the case. This section discusses examples of bichronous learning facilitated by two platforms—learning management systems and online classrooms. Web 2.0/social media tools can also be used bichronously as they allow learners to participate in live or delayed communication and sharing. However, because they play such a prominent role in teacher learning and support, they are addressed separately in the next section of this chapter.

#### Learning Management System

As noted previously, prior to COVID-19 pandemic school lockdowns, online learning typically took place largely within a learning management system. A learning management system (LMS), such as *Moodle*, *Canvas*, or *D2L Brightspace*, is basically an **online class** with the following attributes.

- **An administrative component.** It supports grading, reporting, student information, and typically connects to or has its own student information system (SIS).
- **A content management component.** Learning management systems store content of all types in a library or repository. For this reason, they are sometimes called, "content management systems" and they are sometimes confused with portals (an online repository of content). An LMS can connect to and embed a portal, but it is not a portal.
- **An instructional component.** LMSs come with numerous creation tools so instructors or instructional design teams can create activities that learners do either asynchronously, or synchronously in the LMS itself. These include discussion boards, chats, office hours, virtual meetings, and collaboration tools. Most LMSs also allow integration of "third-party" apps, for example, Google *Drive*, *Big Blue Button*, *Mahara*, *Nearpod*, or course development tools such as *H5P*.
- **An assessment component.** Instructors can build and implement multiple types of assessments within an LMS and grades are automatically uploaded into a gradebook. For closed-response tests, answers can be graded automatically. Open-ended assessments, such as essays or portfolios, can be easier to mark in an LMS through the use of rubrics and other grading supports.
- **A data component.** Learning management systems collect data based on their users' activities. These data often are used to improve the platform's performance, provide better tools, track each learner's progress, review the performance of students, and personalize the learning experience. LMSs also use analytics and early warning systems that can better alert an instructor when a learner is falling behind. These systems can make predictions about a new learner's success significantly better than predictions made with the administrative data alone (Bird et al., 2022).

Courses in learning management systems have traditionally been asynchronous and, like MOOCs, little attention was paid to their pedagogy. Yet LMSs can support bichronous learning—that is, both asynchronous learning (learners log in, read, watch videos, do assignments, take a quiz, participate in discussions) and synchronous learning (live chats, live oral and written discussions, joint product creation, Web meetings)—if the LMS has or is able to embed a Web-conferencing tool.

LMSs have a long pedigree in education. Long before "blended learning" was a thing, instructors used LMSs to host course materials for their in-person classes, hence the designation "content management system." From the mid-1990s to 2020, the majority of formal online learning for pre- and in-service teachers most likely occurred in an LMS, such as *Moodle*, or LMS-type system, like the now defunct but highly popular *Edmodo* platform. How that learning occurred, however, is not known.

### Online classrooms

Online classrooms are a pared-down and simplified form of an LMS. The most well-known online classroom is Google *Classroom*.[20] Google *Classroom* is a free Web service for schools that aims to simplify creating, distributing, and grading assignments between teachers and students. (It also is an example of "Software as a Service"). Though this is changing, Google *Classroom* is primarily used *by teachers for students*. Millions of teachers across the globe have been trained in how to use Google *Classroom* as part of instruction—but its use for other types of professional development seem limited.

Google *Classroom* consists of the following components.

- Google *Drive.* A cloud-based storage space on which the teacher creates a folder ("class") and invites students to enter with a shared link. The class is copied onto the student's Google *Drive* where it then resides. The student submits the assignment to the teacher for grading.
- Google *Calendar.* The teacher adds assignments and due dates to Google *Calendar*. These are pushed out onto the students' Google *Drive*.
- Google Apps for Education (GAFE). These are productivity applications—*Docs, Sheets, Slides, Gmail, Forms, Meet,* and the *Chrome* browser. They form a cohesive, cloud-based platform to manage student and teacher communication. Students can work on their assignments using these tools, collaborate live with classmates and the teacher, and the teacher can add comments.
- Third-party Extensions. There are hundreds of third-party (i.e., not Google) extensions designed to work within the *Chrome* browser to make GAFE more powerful and flexible—for example, rubric builders, translation tools, voice tools for feedback, and so on. These extensions can be found at the *Chrome* Web store.
- Google *Meet.* Google's Web conferencing platform is now integrated with all Google products so teachers can create a unique Google *Meet* link for each class in Google *Classroom*. The link acts as a dedicated meeting space for each class and, unlike other Web conferencing platforms, is time- and date-independent.

Despite these features, Google *Classroom* lacks several features that are found in standard learning management systems. As Google is constantly updating *Classroom*, corrections to the shortcomings listed below may be imminent.

- Reporting. Unlike an LMS, Google *Classroom* does not connect to a student information system or attendance database.
- Fixed appearance. Unlike an LMS, Google *Classroom* can be only minimally customized. All classes in Google *Classroom* essentially look the same and all assignments are stored chronologically, so students and teachers have to do a lot of scrolling to find older assignments.
- No dedicated discussion forum or chat. There are numerous workarounds for this issue, however. For example, the *Stream* feature allows for communication; teachers can create questions in documents and students can respond in real time; learners can collaborate via writing on documents in real time; and teachers can use apps such as *Jamboard* to host online discussions.
- Lack of compatibility. A course created in Google *Classroom* cannot easily be exported

[20] Google *Classroom* is often referred to as an LMS though it is not at least at the time of this guide's publication.

to an LMS (or vice versa) since, unlike an LMS, Google *Classroom* is not SCORM compliant[21] (An LMS can link to Google *Classroom* and *Drive*, however). Nor can users embed non-*Chrome* third-party extensions or software (e.g., MS *Word*) into Google *Classroom*, as one can in an LMS.

- **Closed system.** Google *Classroom* is not an open system and does not have a reciprocal relationship with the majority of platforms and tools. While most LMSs will incorporate Google *Drive*, within Google *Classroom* a teacher can incorporate only Google-approved tools.[22]

Google *Classroom* can, and often does, support individual online work where learners complete an assignment and turn it in for a grade. However, its real power is the functionality and ease of its applications (GAFE) and third-party extensions which make real-time collaboration and sharing seamless. Thus, Google *Classroom* is also often foundational to synchronous activities in online learning.

Since 2014, following the introduction of Chromebooks (essentially a netbook or a thin client computer), and, in particular, since the COVID-19 pandemic, Google has made a powerful one-two thrust into the world of online and blended learning. In the first few months of remote schooling in 2020, Google *Classroom* enjoyed an increase of 100 million subscribers (DeVynck & Bergen, 2020). This growth and the ubiquity of Google services has had very real ramifications for online learning. By offering its products and services for free, targeting schools, actively training teachers to be "Google Certified Educators," and through the power of its *Chrome*-based extensions, Google has created a free online ecosystem and an intergenerational loyal user base, and has defined the contours of the online learning experience in ways not yet fully comprehended (Burns, 2021). This will undoubtedly have market share implications for LMS providers as well as ramifications for the future conceptualization and organization of online learning.

### Summary: Bichronous learning

This discussion of bichronous learning suggests that there is much overlap between the two segments of online learning—synchronous and asynchronous. For example, instructors in asynchronous courses may host live office hours and chats to accommodate the queries of online learners. The degree to which synchronous and asynchronous elements are integrated into an online course suggests that asynchronicity and synchronicity may be better conceptualized as points along a continuum rather than dichotomous categories. This is the conceptual underpinning of bichronous learning—a term that is new but an approach that has long attempted to blend the best, and mitigate the weakest, elements of both asynchronous and synchronous learning.

Not surprisingly, given its semantic novelty, research on the effectiveness of bichronous learning, particularly for teacher learning, is hard to come by (Confusingly, for a while "bichronous learning" was sometimes referred to as "blended learning."). Where it has been studied (McCormick, 2018; Ogbonna et al., 2019; Rockinson-Szapkiw, 2009), synchronous and asynchronous elements have been typically analyzed in isolation and contradistinction rather than as integral elements of a unified whole in which fully bichronous learning can be compared with fully synchronous or fully asynchronous learning (Fabriz et al., 2021). Thus, we know more about the parts of bichronous learning than we do the sum of its parts.

[21] SCORM or Sharable Content Object Reference Model, is a set of technical standards for eLearning software products and is the de facto industry standard for eLearning interoperability. Specifically, SCORM governs how online learning content and learning management systems (LMSs) communicate with each other. SCORM is purely a technical standard; it has nothing to do with design (SCORM.com, 2022).

[22] Read more about Google's efforts to open up *Classroom* here: https://blog.google/outreach-initiatives/education/classroom-the-anywhere-school-updates/

This difficulty is compounded by the fact that a plurality of online learning research does not mention the type of platform used. As this chapter notes, online learning is highly platform-dependent because the platform accommodates or constrains the design of learning and how instruction occurs. Apart from MOOCs, there is very little in terms of research on types of online platforms. Where literature exists, it tends to focus on the non-instructional components of an LMS (Oliveira et al., 2016). Similarly, there is almost no published research on Google *Classroom* or third-party apps as a platform for teacher learning.

There are a few exceptions. One study did look at LMSs, finding mixed results and no significant difference on student learning in an LMS (Coiro, 2014). Another study (Uzun, 2022) examined bichronous online teaching in the context of teacher education. It found that differences that existed among online instructors in their use of bichronous online teaching were dependent on academic and professional qualifications, years of experience in their fields, and their ability to use various educational technologies. It did not examine the impact of bichronous learning on student outcomes. We can infer that using design elements of both online learning approaches—synchronous and asynchronous—produces the "best of both" for learners. But such an inference, no matter how seemingly intuitive, requires a larger body of evidence-based research than currently exists.

### 5.6.4 Summary of Asynchronous, Bichronous and Synchronous Online Courses

This section of Chapter 5 has examined online learning through a synchronous, asynchronous, and bichronous lens and anatomized online learning through its delivery platforms—Web conferencing systems, LMSs, MOOCs, virtual classes, and two-way Web conferencing (Social media will be discussed in the next section). It concludes with an examination of online learning in its totality.

Despite the dominance of online learning as teachers' primary mode of distance education, there is little relative research on the experience of online learning for in-service or pre-service teachers. The research that does exist is typically focused on university students and the general population, hence the use here of adults and university students, respectively, as imperfect proxies for teachers and pre-service teachers. Nor is there much examination of the extent to which the effects of online professional development translate into changes in teacher knowledge and instructional practices.

Nor, surprisingly, is there a focus on learner outcomes as a result of online learning. This is particularly remarkable given that a high percentage of online programs are located in degree-granting tertiary institutions. A systemic review of online teaching and learning from 2009–2018 revealed that the largest number of studies on online learning focused on *engagement* in online learning (presence, interaction, community, and peer-to-peer interaction, as well as completion and attrition). This is followed by *learner characteristics* (self-regulation, motivation, and academic aspects related to the online learner) (Martin et al., 2020a). The least frequently researched themes were evaluation, quality assurance, the use of specific online course technologies (*Moodle*, *Blackboard*, or *WebEx*, for example), instruction, and learning outcomes (only 5% of all studies) (Martin et al., 2020a).

One way to examine the impact of online learning is to contrast it with in-person learning. Here there is some empirical evidence suggesting that online learning can be comparable to or better than in-person learning (Escueta et al., 2020; Hodges et al., 2020; Paul & Jefferson, 2019). Effect sizes from an examination of 125 experimental and quasi-experimental studies on online learning from 1990–2009, with over 20,000 participating university students, demonstrated that in 70% of the cases, online learners outperformed their in-person counterparts. Authors did not examine the differences between synchronous or asynchronous courses, however. They concluded that online education not only is "comparable to traditional instruction, but also, subject to our criteria, can outperform traditional instruction" (Shachar & Neumann, 2010, p. 326).

Two empirical studies, both from the U.S., examined the impact of online learning for educators.The first is a 2010 meta-analysis of research on online learning from 1996 to 2009. It showed, on average, that online learners performed modestly better than those receiving face-to-face instruction (Means et al., 2009, p. xiii). Effect sizes were larger for studies in which the online instruction was collaborative or instructor-directed than in studies where online learners worked independently. The overall finding of this examination was that classes with online learning—either completely online or blended—on average produced stronger student learning outcomes than did classes with solely face-to-face instruction (.20 mean effect size) (Means et al., 2009, pp. 18, xiv). Learning outcomes for those who engaged in online learning exceeded those receiving face-to-face instruction, with an average effect size of +0.24 favoring online conditions. The authors reported that the mean difference between online and face-to-face conditions across the 51 studies was statistically significant at the $p < .01$ level (pp. 18, xiv). They also cautioned that the results may have been the result of dimensions that exceed the type of technology delivery, such as the amount of time that learners spent on task.

A second, multi-tiered impact study examined the pedagogical content knowledge and instructional practices of 118 teachers and their 1,688 students—922 in the control group and 766 in the treatment group—participating in EDC's *EdTech Leaders Online* professional development program. Two randomized controlled trials focused on mathematics instruction (5th- and 8th-grade teachers) and two on language arts instruction (4th- and 7th-grade teachers). For each trial, teachers who volunteered to participate in the study were randomly assigned to the treatment or control group. Teachers assigned to the treatment group then participated in a set of three online professional development courses, each lasting for seven weeks. Collectively, the four trials provide strong evidence that participation in a coordinated series of online courses has positive effects on teachers' *instructional practices* and content knowledge. Across all four trials, larger changes in instructional practices occurred for teachers in the treatment group. In many cases, the effect of the online courses on instructional practices was large. Across all four trials, larger changes in teacher *content knowledge* also occurred for teachers in the treatment group. In most cases, the size of the effect was medium or large. Each trial also provided evidence that teacher participation in the online courses also had positive effects on those teachers' students (Dash et al., 2014:93; O'Dwyer et al., 2010: 93).

Online learning is complex. Because of this complexity, online learning, perhaps more than other mode of distance education, is subject to numerous threats to its quality and effectiveness. The expertise, skill, and responsiveness of instructors all can vary, as can levels of in-person support for learners. The design of learning, the type of instructional activities, content format, and the synchronicity, asynchronicity, and bichronicity may all influence learning outcomes. As *Chapter 14: Preparing Distance Learners* will discuss, success in online learning is driven by a series of discrete and interconnected personal, learning-related, and course- and program-related attributes. Further research is still needed to disentangle these variables and determine their impact on learning online (Escueta et al., 2020).

## 5.7 Web 2.0

The World Wide Web, like distance education itself, is referenced according to "generations" and is classified by two retronyms. Web 1.0 is the first-generation, more "established" World Wide Web. Web 2.0, the second-generation Web, is a broad term that refers to the World Wide Web as a platform where users can not only access but also create and share content (the "read-write" Web). That term has evolved into and is used interchangeably with the term "social media."

Social media is more accurately an umbrella term referring to interactive technologies that allow users to create and share information, interests, and ideas. Social media includes blogs, wikis, photo sharing sites, geo-location services, and social bookmarking sites. At the heart of social media is "social networking"—the ability to connect and collaborate with networks of individuals or groups, both synchronously and asynchronously.

This section discusses Web 2.0 tools, with an emphasis on social media and social networking platforms. Though far from a perfect distinction, this chapter distinguishes between social networking platforms, which often are used for one-to-many communication, versus messaging apps, which often are used for one-to-one communication (although *WhatsApp* operates both as a social media tool and messaging app). Since messaging apps, such as *WhatsApp* and *Signal*, are typically accessed via phones, they are examined in the next chapter on mobile learning.

### 5.7.1 Web 2.0 Tools

It is much easier to use some kind of eLearning platform (an LMS or Google *Classroom*) with a Web-conferencing system. But distance education programs can still support online learning *without* these tools.

In contrast to the traditional World Wide Web (Web 1.0)—a closed system where content creation and consumption are typically conducted by two separate set of actors (producers and consumers)—Web 2.0 is an open, dynamic system where users are both producers and consumers of information, creating and sharing their own personalized content. Typically then, Web 2.0 tools are characterized by three Cs—contributing, creating, and collaborating (Cormode & Krishnamurthy, 2008).

Web 2.0 suffers from the same lexical confusion as many technology terms. First of all, this term, "Web 2.0" is rarely used anymore. In part, this is because Web 2.0 has become so successful that it has transformed software design. Over the years, thanks to Web 2.0 technologies and increased Internet access, software has shifted from a program that is installed on a computer to a service residing in the cloud, hence the concept of "software as a service" (SaaS), another term often used instead of "Web 2.0." In the SaaS model, software is centrally licensed on a monthly or annual subscription basis and stored on Internet-based servers. It thus can be accessed on any device that is connected to the Internet. In exchange for an ongoing fee, vendors take care of updates, new information, upgrades, and other processes associated with this content or software.

Web 2.0 platforms are extraordinarily popular within education for both for student and teacher learning. They allow learners to do many—though not all—of the same things they do in an LMS at a much lower cost. For example, learners can participate in asynchronous or synchronous discussions in *Parlay* or *Kialo*; take a quiz in *Kahoot*; collect ideas and vote on them using *Tricider*; share presentations through *Slideshare*; create interactive, annotated texts and videos in *Actively Learn*; check for student understanding with *Go Formative;* and use free assessment and feedback tools such as *Floop*. Distance education designers can use *Nearpod*, *PearDeck*, or *EdPuzzle* to create interactive multimedia activities for teachers as part of online or blended courses.[23] Their narrower set of features often means that Web 2.0 platforms don't have the learning curve of an open-source LMS or MOOC platform or the expense of a commercial LMS. Many of these

[23] Two sites for examining and accessing Web 2.0/SaaS tools are at https://blogs.umass.edu/onlinetools/. For examples of stand-alone tools, visit https://www.toptools4learning.com/.

applications can be integrated into an LMS, Google *Classroom*, a MOOC platform, or a Web-conferencing system.

The danger, as always, is that these tools are monetized (in the case of the free ones); cannibalized by edtech rivals (in the case of the popular ones); or bought by an educational technology giant who raises fees associated with their use or discontinues their use. These disruptions, which are not infrequent, often mean that distance programs that rely on Web 2.0 platforms can lose data, content, activities, or in some cases, their whole program (Mollenkamp, 2022).

### 5.7.2 Social Media

Social media is a subset of Web 2.0 tools, but the two terms often are used interchangeably. Social media's growth has been both expansive and dramatic. As of December 2022, there were 4.7 billion social media users across the globe, and these users are spending more time on social media sites—an average of 147 minutes per day in 2022 versus 90 minutes per day in 2012 (Statista, 2022b; Statista, 2022a). *TikTok*, a video sharing site, grew to 1 billion users in less than five years, far faster than the growth of any other technology in memory. In just three years (2018–2021), the average number of hours Americans spent on *TikTok* grew by 67% (Harwell, 2022).

Like the population at large, teachers across the globe have enthusiastically embraced social media in both the Global North and Global South. Numerous teachers create blogs; download and upload learning resources through *Canvas Commons;* communicate with other teachers through *Facebook*; analyze classroom video episodes with colleagues via *VoiceThread*; share ideas for teaching and participate in classes via *TikTok*; connect with other teachers, stay current on educational trends, and look for education-related job postings on *LinkedIn*; use Google *Docs* to create collaborative lesson plans and classroom materials; design or participate in a course in *Wikiversity*, a free, open, Web-based university; and create a social network with students via *Twiducate*. Teachers with particular physical needs may use accessible social media Web sites such as *Accessible YouTube, Easy Chirp,*[24] and *You Describe* to access content and information.

Figure 5.6 outlines some of the more popular types of social media tools for teaching and learning.

Whether as part of a formal face-to-face or distance learning approach, different social media tools have different affordances for teacher learning (Jordan & Mitchell, 2020). For this reason, they have increasingly been integrated into, supplemented, and evolved into their own form of teacher professional development—as self-study tools, as part of professional learning networks with other educators, or as distance learning platforms in their own right.

### 5.7.3 Benefits of Web 2.0 Tools for Teacher Education

Web 2.0 tools, including social media and social networking sites, have proven to be popular vehicles for teacher learning, offering many benefits as summarized below.

#### Web 2.0 tools can deepen teachers' professional knowledge

The duality of Web 2.0 tools—the fact that they can serve as both authoring and communication tools—can help teachers feel comfortable both with creating information and with communicating and collaborating around that information (Burns & Bodrogini, 2011). Studies from Bhutan, Pakistan, Kenya, and Indonesia show that simple-to-use social media applications provide teachers and teacher educators with opportunities to access, develop, and share free, high-quality content, encouraging them to be creators, not simply users, of content that they can use as part of teaching (Burns & Bodrogini, 2011; Impedovo et al., 2019). *YouTube*, where teachers

[24] As of this writing, this site is still in use but no longer maintained.

**Figure 5.6**
**Social Media Types**

| Social Media Type | Description | Examples |
|---|---|---|
| **Blog ("Weblog")** | • Typically these are free websites that allow subscribed users to read, comment on existing ideas, and share new ideas.<br>• Authors and readers also can communicate with each other via the blog.<br>• Blogs can be part of an organization, a stand-alone site, or run by an individual or groups of individuals.<br>• Blogging is a style of writing characterized by short articles and more informal language and can be subjective or personal. | • *Edutopia*<br>• *eLearning Industry*<br>• *La Clase de Miren*<br>• *Un Monde Meilleur* |
| **Location-based services** | • Available through the Global Positioning Service (GPS) function of mobile devices, these services or "applications" can be downloaded to smart phones or tablets.<br>• Some, but not all, pinpoint a user's geographic position as well as the position of others and allow users to view, edit, and use geographical data from anywhere on Earth. | • *Foursquare*<br>• Google *Earth*<br>• Google *Maps*<br>• *Open Street Map*<br>• *Ushahidi* |
| **Media sharing** | • These sites allow users to post media (e.g., images and video), tag media, have conversations around media, and form interest groups. These are also often called "peer-to-peer" or P2P sites. | • Instagram<br>• Flickr<br>• TikTok |
| **Microblogging** | • These are sites that use simple composition and publishing techniques so users can interact and communicate in short messages.<br>• In *Twitter*, users "tweet" and "retweet" messages and are limited to 280 characters.<br>• In *Mastodon*, "tweets" are "toots" and "retweets" are "boosts." They have a 500-character limit. | • *CounterSocial*<br>• *Mastodon*<br>• *Sina Weibo*<br>• *Telegram*<br>• *TweetEmote*<br>• *Twitter* |
| **Social bookmarking** | • On social bookmarking sites, users annotate websites through "tags," share Web-based resources, and communicate and form communities around such resources. | • *Diigo*<br>• *Google Keep*<br>• *Pearltrees*<br>• *Symbaloo* |
| **Social networking** | • These are online platforms in which people construct social relationships with others based on similar personal or career content, interests, activities, backgrounds, or real-life connections.<br>• They are increasingly specialized. For example, *Natterhub* is designed to help teachers instruct children to use social media ethically. | • Facebook<br>• *Horizon* (VR social network for *Meta Quest* users)<br>• *LinkedIn*<br>• *Natterhub* |
| **Wikis** | • Wikis are akin to a group journals.<br>• They allow multiple users to collaboratively manage, create, and edit webpages within a Web browser. | • *Wikidata*<br>• *Wikimedia*<br>• *Wikipedia* |

can watch examples of reading instruction, differentiated learning, or grouping techniques, may very well be the world's most popular teacher professional development platform (Burns, in press). (Creation of digital content will be discussed in Chapter 12.)

These professional benefits of social media extend beyond simple content development, sharing, and curating. Social networks can play a central role in the introduction of innovative pedagogical practices and better understanding of content-related pedagogical practices (Duncan-Howell, 2010; Jordan & Mitchell, 2020). For instance, in one study in Bhutan, 92% of teachers surveyed reported that their social media use positively impacted their professional practice, helping them learn new teaching ideas and stay current on innovative approaches (Impedovo et al., 2019). In the same study, Pakistani teachers expressed similar sentiments. A small study of Kenyan teachers' *Facebook* use showed that teachers spent a significant amount of time within this platform focusing on curriculum and how best to teach it (Bett & Makewa, 2020).

### Web 2.0 tools offer highly personalized professional development to teachers

The structure and interface of Web 2.0 platforms, particularly social networking platforms, portend continued transformation of distance learning from the walled gardens of LMSs and Web conferencing systems to more organic, teacher-driven communities of practice (Pérez Sánchez et al., 2017). Through social media, teachers engage with customizable content and interact with their own learning team, sharing experiences and studying various components of teaching based on their own differentiated needs (Burns, in press; Impedovo et al., 2019). The very architecture of social networking sites—their use of predictive algorithms that make assumptions about users' potential interests—allows for greater personalization. Teachers receive customized feeds in a technically simpler, less uniform, and more dynamic way and can then tailor, annotate and reshare this content.

Social networking sites, in particular, can bring resources and expertise to classrooms and teachers who may lack both. This is particularly valuable for young teachers wrestling with their first year of teaching or for those who may feel ill-equipped to teach a particular content area, as well as for more experienced teachers struggling with the conceptual and logistical burdens of implementing an innovation (e.g., computers) in their classroom.

### Social media can help teachers establish and nurture strong professional relationships across distances

The real value of social media for teacher education is that it allows teachers to create, join, and expand personal learning networks (PLNs). PLNs facilitated by social media offer two valuable supports for professional learning. First, they can complement and enhance face-to-face relationships, deepening existing relationships or "bonding ties" (Gittell & Vidal, 1998). Bonding ties often form the basis of communities of practice, which in turn are instrumental in helping schools and teachers institutionalize new ideas and practice. They also can allow teachers to benefit from "the strength of weak ties" (Granovetter, 1973). Novel or new information flows to individuals through weak, versus strong, ties. Since we move in the same circles as our peers, we tend to know the same information as they do. But by interacting with new peers, teachers can acquire new knowledge and skills from people with whom they would not normally come into contact. This in turn can ostensibly facilitate integration of new perspectives and ideas into their existing practice, which can ideally improve instructional quality (Bett & Makewa, 2020; Impedovo et al., 2019). These ties are even more crucial when teacher groups are geographically dispersed, as they may otherwise have no opportunity to learn from others (Impedovo et al., 2019; Jordan & Mitchell, 2020).

### The development of professional and personal relationships with other teachers can begin to lay the foundation for communities of practice

The above networked relationships are one of the key factors influencing the effective functioning of small groups, particularly when such groups are engaged in knowledge-intensive work (Yuan & Gay, 2006). But to instantiate and institutionalize changes, teachers must be part of a community of practice. As will be discussed in *Chapter 15: Building Community*, technically simple, multimodal social media applications, utilized as part of a larger collective purpose, can reduce isolation, make learning and experimentation less risky, and promote mutuality and reciprocity—all of which create the foundation for a community of practice.

### By their very design, social media platforms epitomize many of the characteristics associated with optimal learning environments

For instance, social media sites such as *Facebook* embed many of the qualities of a good "official" education technology in their reflective elements, mechanisms for peer feedback, and compatibility with the social context of learning. The conversational, collaborative, and communal qualities of social media tools complement much of what we know to be "good models of learning, in that they are collaborative and encourage active participatory roles for users" (Maloney, 2007, p. 26). Interviews with teachers from countries as diverse and widespread as Bhutan, Pakistan, Indonesia, Brazil, Honduras, Ecuador, Zambia, Philippines, the U.S., Ireland, and Federated States of Micronesia suggest that teachers use a variety of social media technologies such as *Instagram, YouTube*, and blogs because of their accessibility, their networked nature, and ease of use (Burns, in press; Burns & Bodrogini, 2011; Impedovo et al., 2019). Thus, for many teachers, social media serves as a public square where they can share ideas, experiences, and opinions.

### Social media can promote informal learning

Informal learning is learning that is educationally beneficial but not required by the institution and occurs outside the regular school day or beyond formal teacher in-service sessions or classes. Whereas formal learning is typically institutionally sponsored, school-based and structured informal learning "is not typically classroom based or highly structured, and control of learning rests primarily in the hands of the learner" (Marsick & Watkins, 1990, p. 12). Informal learning can accrue from opportunities offered by Web 2.0 applications for learners to engage and collaborate in socially connected networks of peers and online services, allowing learners to take control of their own experiential learning in non-school spaces and at times and with colleagues of their choosing (Selwyn, 2007).

### Social media can diversify and broaden traditional online structures of communication in ways that non-social media applications may not

Because of the hierarchical and threaded design of learning management systems, the dominant pattern of communication in online learning discussion forums tends to be a "hub-and-spoke"–based structure of Instructor (hub)—Learners (spoke), with much or most of the discussion emanating to and from the instructor. Discourse analysis from an online course in Indonesia that incorporated social media revealed a more networked communication pattern when educators used social media versus when they used the discussion forum in their LMS, *Moodle* (Burns & Bodrogini, 2011). Similar communication structures were found in network density analysis of knowledge exchanges among 78 Chinese pre-service teachers using *WeChat* versus the *Moodle* discussion board. While *Moodle* and *WeChat* both facilitated collaborative learning, researchers noted higher density communication on *WeChat*, suggesting that it might have "a special affordance for social interaction" (Sun et al., 2018, p. 257). Findings such as these may help online learning programs make informed decisions about which communication tools to use, and for what purposes, as part of formal online learning (Sun, et al., 2018).

### 5.7.4 Limitations of Web 2.0 Tools for Teacher Education

Social media has proved itself to be a promising teacher education tool, fostering cooperation and collaboration, promoting real-world uses of technology, and broadening teachers' exposure to people, places, and resources. But many of the attributes mentioned above also make social media a particularly troubling technology. For example, its predictive and personalized nature and flat, fast structure accelerate and augment the proliferation of rampant misinformation and disinformation ("fake news") as will be discussed in greater detail in the next chapter.

Social media has other drawbacks: its documented threats to mental health (primarily for adolescent users); the commodification of formerly free sites; difficulty in safeguarding intellectual property; the competition and transformation of social media into full-fledged media companies that track users' data (often without consent); its constant froth of hate speech, trolling, rudeness, and general snarkiness; and violation of students' rights by teachers who often film and upload classroom episodes involving students without student or parental consent (Anderson, 2017; Burns & Bodrogini, 2011; Tait, 2022). Further, social media sites, particularly video sharing sites such as *YouTube*, *TikTok*, and *Reels*, use monopolistic practices. By deliberately designing video data portability to be so difficult, they essentially force video viewers and creators to watch and share videos on their platforms alone (Arnao, 2022).

Besides the above threats, Web 2.0 applications must be carefully selected and employed as either part of distance instruction or as a carefully crafted stand-alone professional development mode, and a number of design issues should be considered. First, the utility of Web 2.0 applications still depends on *human* networks—the key is a knowledgeable body of peers committed to sharing ideas and experiences. Care must be taken to design activities within Web 2.0 applications that are truly interactive, collaborative, and that encompass a network of users. Next, the use of social media should occur within a specific pedagogical framework with activity structures to better help teachers capitalize on the heterogeneity of social media; should be developed according to tenets of learner-centered instruction; and should present a set of shared norms to guide all interactions and transactions (Burns & Bodrogini, 2011, p. 188).

Finally, online course designers must help learners understand the importance of constructing knowledge and the importance of being members of an active online community where they have continuous opportunities for communication and collaboration. Teachers need to understand that online discussions and shared practice are the ties that bind a collection of individuals into a collaborative community, as well as how and why shared interactions enhance and deepen learning (Burns & Bodrogini, 2011, pp. 188–189). Often, education-related Web 2.0 sites have no evidence of interaction, preserve the broadcast nature of Web 1.0 applications by placing lots of text on a site, and fail to encourage feedback or conversation. As a result, these sites have a minimal number of users and limited potential as a PLN.

Social media and its use as a community building tool will be discussed in greater detail in Chapter 15.

## 5.8 Considerations: Online Learning for Distance Education

This chapter has discussed blended learning, formal online learning (i.e., courses) and social media—three forms of online learning that are rapidly evolving both technically and educationally. Despite its popularity, however, online learning writ large is under-researched, and its requisites still poorly understood by many distance education systems wishing to employ it. Therefore, as its enumerated benefits and limitations suggest, like many technologies, online learning has been both a success and a failure as a professional development and teacher training option. This section concludes with final considerations about online learning.

### 5.8.1 Benefits of Online Learning

**Online learning can function as a replacement for face-to-face instruction, particularly in cases where the latter is too costly or is logistically impossible to conduct successfully**

The viability of online learning is often determined by its comparison to other distance technologies. Yet one of the most fundamental, but rarely asked, questions about online learning is whether or not it increases access to education for those who face barriers to pursuing an in-person degree. In many parts of the globe—for example, in parts of Sub-Saharan Africa—the answer is no because of severe infrastructural challenges. But in other parts of the globe, as Figure 5.7 illustrates, the answer is affirmative. In such locations, online learning has proved to be a "cost-effective intervention when too few learners are situated in a particular geographic locale to warrant an on-site instructor" (Means et al., 2009, p. 3).

As Figure 5.7 discusses, without online learning, access to learning would be impossible in many locations across the globe, such as remote communities with sparse populations but telecommunications infrastructure as in Arctic communities, Inuit and First Nations communities in Canada, or rural and Native American communities in the United States.

**Online learning can enhance the learning experience**

As an enhancement activity, online learning should produce outcomes that are not simply equivalent but measurably *superior* to those resulting from face-to-face instruction alone (Means et al., 2009). If this improvement occurs, online learning as an enhancement may be worth the additional time and resources. If not, it may be a waste of time and money since its addition does not improve learning outcomes.

**Figure 5.7**
**The Case for Online Learning in Greenland**

Arctic communities have long faced challenges with remote learning—but not the kind associated with COVID-19. Rather, it is in-person learning at the secondary level that is often too remote to access. This is true, for example, in Greenland, a self-governing region within the Kingdom of Denmark and the world's largest island. With a total population of 56,000 people, this mostly ice-covered island's population density is the lowest in the world (Government of Greenland, 2019).

While in-person primary-school access is available in most communities, the situation changes upon completion of primary school. Students can continue their education at a junior secondary school—a "continuation school"—but most schools are in the main population centers or in Denmark. And if students want to go to upper secondary school, they have to move away from their families and live in one of the four towns with a high school. Consequently, over half of Greenland's population does not progress beyond lower secondary school and 60% of its 18- to 25-year-olds do not complete high school or vocational education. In other Nordic countries, the latter rate is less than 25% (Government of Greenland, 2019, p. 14).

Enter online learning. Ninety-two percent of island residents now have access to 4G networks suitable for streaming video and synchronous virtual learning. Through online classes, secondary students can live at home as they continue their education. The government of Greenland has partnered with Danish foundations to bring quality online education, via tablets, to primary schools (the Kivitsisa project) and eventually to develop online classes.

Developing an online secondary education program will pose various challenges in terms of getting devices to students, teacher training, and the development of specialized multimedia content in Greenlandic (Conyers, 2020). But it offers hope that education will not involve separation from one's family, community, and culture while learning. Learning *online* can actually ensure and preserve vital in-person community ties.

Part of this enhancement is grounded in choice. Online education can offer teachers greater choices in learning options (Escueta et al., 2020). With in-person learning, teachers are constrained by travel or driving to a nearby university. In contrast, online learning offers learners access to more programs, across more universities, locally, nationally, or internationally—and with superior learning outcomes in many cases (Dash et al., 2014; Means et al., 2009; O'Dwyer et al., 2010; Paul & Jefferson, 2019).

### Online learning provides access to continuous quality learning

Teachers across the globe see the value of high-quality professional development and want ongoing professional learning that meets certain conditions (Burns, in press). For example, 91% of U.S. teachers in one survey reported their desire for professional learning focused on a teacher's specific, unique needs, and 82% want more frequent professional development (Kuykendall, 2022).

Online learning can provide teachers with this kind of targeted, differentiated, and more frequent "anytime, anyplace" access to sustained and ongoing learning as well as to ongoing access to follow-up support to help teachers implement innovations in their classrooms. This access is particularly valuable for traditionally underserved groups and for teachers in remote geographical areas, where face-to-face professional development would be impossible (Escueta et al., 2020).

Above all, online education eliminates two of the biggest factors influencing the quality of education. The first is a teacher's geographic location (Chaney, 2001, as cited in Berry, 2017, p. 32). Second, teachers (like students) often suffer from instruction and instructional providers characterized by variable degrees of quality. As with Interactive audio instruction and instructional television, online learning, particularly via self-paced or collaborative courses, can standardize the quality of instruction that teachers receive (Berry, 2017).

They key measure here, however, is *equivalence:* If learner outcomes are the same whether a course is taken online or face-to-face, then online instruction is considered successful (Means et al., 2009).

Yet as important as this is, for many current and future teachers with no other options for professional learning, online learning's ability to increase *access* to learning may justify its use regardless of its outcomes or the other issues associated with it.

### Online learning is convenient

Throughout the course of their careers, teachers will, at some point, require continuing education for renewing licensure, meeting continuing education requirements, gaining promotions, or upgrading their skills. Many of these teachers also will need learning opportunities that are flexible so they can balance professional and family-related obligations and keep generating an income as they study (Hoxby, 2017; Paul & Jefferson, 2017).

All types of online learning—synchronous, asynchronous, and bichronous—allow teachers to remain in their homes, schools or communities while studying, thus eliminating the need to travel to professional development (Nieuwoudt, 2020). It provides the type of flexible access to experts and to archival resources that fiscal and logistical constraints would otherwise limit. Even within cohort-based online courses, teachers can complete parts of assignments (such as watching a video, reading, and individual learning activities) or participate in micro-credentialled classes at home, according to their own schedules. This "any time, any place, any pace, any amount" learning is particularly advantageous for teachers in rural areas but is beneficial for all teacher learners because it increases access to different types of continuous learning and control over that learning.

Online learning also can address growing demands from learners for short, just-in-time learning modules that fit an immediate need. Learners who successfully complete such modules could receive "badges" or micro-credentials, with the possibility of credit transferred at a later time into a more formal program, such as a graduate degree. This has begun in Canada and in Singapore, where governments have introduced training and learning tax credits for ongoing education. Thus, such short courses, whether taken alone or "stacked" to form a certificate or diploma, may become an increasingly common feature of continuous education (Contact North | Contact Nord, 2020, p. 7).

#### Online learning offers multichannel learning

Online learning blends all distance learning modes, such as print, multimedia, audio, and video, with the real-time communication and collaboration attributes of the Internet. It provides the opportunity for more one-on-one interactions between learners and instructors than may be the case in other forms of distance education or even in large in-person courses. Thus, it is potentially the most diverse and multimodal form of teacher distance education, and as such has the ability to target more learning preferences more successfully than any other mode of distance education. Along with mobile learning, online learning represents the only form of distance education that can offer access to such a wide range of resources, experiences, and live human expertise, making possible video-enabled real-time communication and collaboration with peers across the globe.

Asynchronous online learning benefits learners who are shy, quiet, or reticent to participate in live, synchronous, or in-person discussions. In asynchronous discussions, learners can take time to compose their thoughts and ideas and have time to reflect on how they want to respond to a question or discussion prompt. Synchronous courses can benefit those learners who are more gregarious, social, or prefer working with colleagues. They can use web conferencing platforms to facilitate live discussions and collaboration. And bichronous learning helps learners who want to balance the efficiency of completing assignments alone with the support and collegiality of working with other online colleagues.

#### Online learning is popular with teachers

Popularity is an attribute that should not be discounted. Professional development is often a tough sell to teachers, for a variety of reasons. Where online learning is offered, it is extremely popular, as seen by the increase in its supply and demand. Motivation is an important ingredient in willingness to engage in and complete formal learning opportunities. Teachers across the globe appreciate the convenience, flexibility, and customizable nature of online learning (Burns, in press). In South Korea, where the vast majority of professional development is offered online, a survey of 380,000 teachers who took in-service online courses found that they generally praised the high quality of online offerings (Latchem & Jung, 2010). In the U.S., 71% of teachers expressed an interest in online, on-demand professional learning (Kuykendall, 2022).

Through Web-based video, webcasts, webinars, and virtual classes, teachers can observe various instructional styles in classrooms that are both similar to and different from their own. Online professional development can provide access to experts, experiences, colleagues, tools, and resources that would otherwise be impossible without the Internet. Teachers can access a far greater variety of professional development, often free of charge, from multiple sources via the Internet. They can choose alternative interpretations, areas of interest, and even sources of accreditation. Internet educational portals, communities of practice, blogs, educational websites—and perhaps above all, *YouTube*—can provide teachers with access to a broad array of ideas, teaching and learning resources, and ongoing, self-paced, personalized, just-in-time professional development. No other distance mode offers such diversity.

### 5.8.2 Limitations of Online Learning

Online learning is growing at a rapid pace (Kizilcec et al., 2017). As a result, boosters of online learning claim that it has made learning more accessible, affordable, and offers the same quality as in-person learning—claims that would be impressive if they were entirely accurate. In fact, despite the many benefits of online learning, its results are more complex and, in many cases, sobering. While online learning offers numerous benefits to teachers, it also suffers from real limitations that undermine its quality, utility, and *raison d'être* as a vehicle for teacher education.

### Online learning often suffers from poor quality and a lack of quality assurance

Online learning still struggles not just with perceptions of low quality but with actual low quality (Burns, 2020a; Global Education Monitoring Report Team, 2022; Hoxby, 2017). This is indeed ironic since, as Section II of this guide makes clear, there are standards for almost every element of online learning—design, content, instruction, coaching, and professional development, as well as quality assurance frameworks.[25] Yet issues with quality are pervasive. In Botswana, for example, difficulties in regulating the large number of online programs offered by non-state institutions have resulted in numerous unaccredited and substandard teacher education programs (Global Education Monitoring Report Team, 2022). While Means et al.'s (2009) meta-analysis of online learning shows that learners participating in classes with online learning do better than those in exclusively in-person programs, those effects are "modest," making it harder to advocate for the measurable superiority of online learning. Thus, as will be emphasized in Section II of this guide, online courses are not *ipso facto* high quality or interactive—they must be made so.

Hoxby (2017) notes that most adult online learning programs are "nonselective"—they enroll any student who has completed the previous level of education, such as a high school diploma or General Education Development (GED) certificate in the case of university undergraduates. While this is key to the success of open and distance learning, it also is a design flaw that shapes many of the weaknesses of online learning.

In the United States, virtual schools (i.e., online schools), which provide a partially or fully online education to primary- and secondary-age students and often claim to provide a superior education to that offered in public schools, have not produced better student outcomes compared to brick-and-mortar schools. In fact, the opposite is true: Many full-time virtual schools have produced measurably worse outcomes (Molnar et al., 2021). Horn (2021) argues that such determinations are misleading and inaccurate since virtual schools educate harder-to-teach and more nontraditional learners than do in-person programs, and that the measures used to assess their quality are ill-fitting. (Virtual schools are discussed in greater detail in Chapter 13.)

### The financial benefits of online learning are often overstated

Arguments in favor of online learning often cite its cost effectiveness, noting that over time it may be less expensive than traditional teacher training and that it reduces marginal costs associated with teaching more learners (Escueta et al., 2020). Because online degree programs are typically less expensive than in-person ones,[26] this should, the

[25] Online learning providers have a plethora of models of standards from which to draw to ensure that their courses meet minimal quality standards. For example, the Philippines, Singapore, Sri Lanka, Pakistan, Nepal, Vietnam, Myanmar, Thailand, and Qatar draw in varying degrees from UNESCO's ICT Teacher Competency Framework. All 50 U.S. states follow the International Society for Technology in Education (ISTE) technology standards, which specifically reference online and blended learning. ISTE and Learning Forward offer standards for coaching. South Africa's Professional Development Framework for Digital Learning is exemplary in terms of discussing in depth how technology can support high-quality instruction. Pakistan developed national standards in 2016 to accredit distance teacher education programs and thus increase regulatory oversight over them (Global Education Monitoring Report Team, 2022). Within this guide alone, Chapter 8 (Figure 8.2) provides examples of national teaching standards and Chapter 9 (Figure 9.1) of teacher professional development standards. Chapter 11, which focuses on instructional design, references the Association for Educational Communications and Technology checklist for multimedia and digital content as well as the National Standards for Quality Online Learning for online course design. Chapter 13 (Figure 13.3) lists standards for online instruction. Finally, Chapter 19 outlines numerous quality assurance frameworks for online programs.

[26] Part of this low cost relative to in-person programs is because there is no campus, no learner services, no real teaching staff—just technical staff and a financial person (Hoxby, 2017).

argument goes, result in higher private and public return on investment (ROI) for both individual learners and governments that provide loans and grants for those obtaining an online degree (Hoxby, 2017).

The reality is more complex. As Chapter 11 will discuss, though online learning is not the most expensive form of distance education, an online learning system is expensive to build. Further, not all forms of online learning can add learners at low- or no marginal cost—this is true only for *asynchronous self-paced* online courses that lack an instructor. One more learner in a synchronous, cohort-based course makes more work for an online instructor and involves more cost for a program.

At the postsecondary level in the United States, students in online programs face significant disadvantages. Data from the National Postsecondary Student Aid Study's 2010/2011 representative survey indicate that online learners are "older, have lower levels of parental education, are more likely to be single parents themselves, and are more likely to be working full-time while enrolled in school than other (university) students" (Deming et al. 2016, as cited in Escueta et al., 2020, p. 928). (Though these are generally university students, they also may include those obtaining pre-service teaching degrees.) These inherent learner-related characteristics and the inherent demands of learning online mean that online learners have far higher rates of attrition than is true for in-person learners.[27] This attrition undermines arguments about the cost-effectiveness of online learning.

It also undermines arguments on online learning's Return on Investment (ROI)—essentially the net profit or loss of an investment by its cost, expressed as a ratio. In terms of its return on investment, Hoxby (2017), using data from U.S. Internal Revenue Service and National Center for Education Statistics Integrated Postsecondary Education Data System (IPEDS), analyzed data from nearly every person who "engaged substantially in online postsecondary education" in the United States between 1999 and 2011 (p. 443).

Figure 5.8 highlights some of the key findings of her longitudinal study. As these data show, the ROI of online postsecondary education is modest at best. Online learning is *not* substantially less expensive for society than comparably selective in-person education. Learners themselves pay more for online education than for in-person education, even though the resources devoted to their instruction are lower. While online enrollment does usually raise learners' future earnings, it is almost never by an amount that covers the social cost of their education. This failure to cover social costs is important for federal taxpayers who, apart from the learners themselves, are the main funders of online education. The failure implies that federal income tax revenues associated with future increased earnings could not come close to repaying current taxpayers (Hoxby, 2017, pp. 453–454).

Most online learners' earnings do not rise by an amount that covers even their private costs—the tuition and fees that they themselves, as opposed to governments, pay. As Figure 5.8 indicates, this suggests that former online learners will struggle to repay their federal loans. As a result, online education is controversial among U.S. federal policymakers for three reasons.

- The sector's learners generate a disproportionate share of defaults and repayment issues with student loans.
- They also account for a disproportionate share of tax expenditures on tuition and fees.
- In federal undercover investigations and audits, online postsecondary institutions have been disproportionately found to "[engage] in deceptive marketing, fraud, academic dishonesty, low course-grading standards,

[27] Attrition will be explored at length in *Chapter 14: Preparing Distance Learners.*

and other violations of education regulation" (Hoxby, 2017, p. 402).

It is important to bear in mind that the above analysis, as well as data presented in Figure 5.8, are primarily post-secondary online programs for adults in the United States, *not* online courses for teachers. Still, findings should temper some of the boosterism around the preeminence of online versus in-person education and prompt introspection among many online programs.

### Online learning is highly dependent on robust infrastructure

The Internet presents a rich array of offerings: real-time communication and collaboration capabilities; the ability to provide audio- and video-based examples of good instruction; complex, content-based simulations and multimedia; and capacity for interactivity with content, people, and experiences. To take full advantage of these, teachers need access, near or at their places of employment, to well-functioning computers and high-speed Internet capable of quickly transmitting audio, video, and multimedia files. Yet telecommunications monopolies that charge exorbitantly high rates for Internet access, uneven electrical supply, low bandwidth, and poorly functioning and maintained computers found in many countries or regions mean that teachers have no access to online learning or that distance education institutions have no recourse but to place lots of low-bandwidth text on a website. In this example of "old wine in new skins," online learning devolves into an expensive print-based delivery system.

These infrastructure limitations—to hardware, bandwidth, and electricity—arguably impact online learning more than any other mode of distance education. Print, audio, visually-based, and mobile learning distance initiatives experience far fewer struggles connecting to learners vis-à-vis online learning.

### Online learning has high entry barriers

As will be discussed in *Chapter 14: Preparing Distance Learners*, online learning demands much of those who engage with it. Instructors and learners require a range of skills to be successful in an online environment. Online learning demands a diverse range of common "literacies" among instructors and teacher-learners—traditional literacies, such as reading and writing; digital literacies, such as technology skills,

**Figure 5.8**
**Return on Investment (ROI) in online post-secondary education in the United States (based on Hoxby, 2017)**

**Online postsecondary education is subsidized by taxpayers.** On average, the social cost of a year of exclusively online postsecondary school is $8,325, of which $3,620 (43.5%) is funded by federal taxpayers through grants and tax expenditures (Hoxby, 2017, p. 424).

**Online learners rarely fully repay loans.** Online learners are overrepresented among those who default on U.S. federal student loans or enter income-based repayment schemes. They are thus less likely to end up repaying what they owe nor do they typically repay current federal taxpayers through higher future federal income tax payments (Hoxby, 2017, pp. 453, 425).

**ROI for society is low while social costs are high.** As a result of the previous point, social ROIs are below 1 for exclusively online education (An ROI of 1 means both the investment and return are equal). Even if online graduates repay 50% of their loans, federal taxpayers will have funded 69% of the cost of their education, with little recoupment through higher future taxes (Hoxby, 2017, p. 425).

**Private ROI is higher, but still not great.** Not surprisingly, private ROIs are uniformly better than social ROIs, since private costs, which are in the denominator of the ROI equation, are uniformly smaller than social costs. Yet, when they enroll in online programs, people lose rather than gain earnings (Hoxby, 2017).

**Mainly online graduate education has somewhat better ROIs.** They are "far below 1 or negative for two- and three-calendar-year episodes, hover around 1 for four-year episodes, and are always well above 1 for the comparatively rare five-year episodes" (Hoxby, 2017, p. 443).

production skills, and retrieval skills; information literacies, such as critical thinking skills, analysis skills, and evaluating sources. These literacy requirements may make it a *poor* choice of distance education in many cases and in many parts of the globe.

Online instruction involves teaching skills that are unique to a virtual environment. As will be discussed in *Chapter 13: Preparing Distance Instructors*, online instructors specifically need to be able to facilitate online discussions that are rich and meaningful, respond in a timely manner to teachers, and model active learning strategies. Most online programs fail to prepare their instructors to teach online, thus resulting in what is generally perceived as low-quality online instruction (Bawa, 2016; Berry, 2017; Garrett et al., 2021; Lowenthal et al., 2018).

Further, as *Chapter 14: Preparing Distance Learners*, contends, online learning requires strong social, emotional, and behavioral skills of learners—a certain level of readiness as autonomous, self-regulated, independent learners with strong time-management and organizational skills, who understand the importance of being an active member of an online community. Its lack of boundedness to time and place means that these e-readiness skills are absolutely crucial. But often these are the very skills absent among teacher-learners who have been acculturated (as students and as teachers) in education systems that emphasize hierarchy, individual achievement, competition, obedience, passivity, conformity, and structure. The flexibility required and the paucity of in-person contact inherent in online education may mean that only highly self-disciplined students learn well on such platforms (Hoxby, 2017).

Further, as Chapters 13–16 will discuss in detail, instructors and learners in an online learning environment require human support—perhaps even more face-to-face support than in a traditional learning environment. Because online learning occurs in virtual—as opposed to physical and temporal—space, in which learners are separated from instructors and the how, where, and when of working and learning are highly unstructured, human support is not *less* important but rather *more* important for teacher success, especially for novice online learners. This support can be online, blended, or face-to-face—and though not a cure all, it must occur (Halkic & Arnold, 2019). As international examples of Web-based distance education programs demonstrate, there are indications that online programs using such supports enjoy higher rates of success than those that do not (Means et al., 2009).

### Online learning suffers from equity issues

This chapter has discussed the high attrition rates associated with MOOCs and their disproportionate effect on low-income, at-risk, and marginalized learners. This is not unique to MOOCs. Indeed, online learning writ large suffers from a "global achievement gap" (Kizilcec & Halawa, 2015) as the equity issues that persist across the higher education system are also prevalent in online courses (Acosta et al., 2021). Attrition rates are much higher among certain groups—learners who are poorer, learners from the Global South, those who may not have been raised speaking the online course language of instruction, and those who struggle academically (Acosta et al., 2021; Mitchell, 2020, as cited in Burns, 2021; Kizilcec et al., 2020).

A 2011 review of 36 studies on online learning in community colleges (typically two-year higher education institutions in Canada and the United States) found that online coursework actually may hinder academic progression for low-income and underprepared students. Learners are less likely to complete courses if they take them online, although this tendency may be "particularly pronounced among community college students, who tend to be disproportionately low-income and academically underprepared ... tentative evidence suggests that taking online courses may discourage learners from returning in subsequent semesters and moving on to subsequent courses in their program sequence" (Jaggars, 2011, pp. 9, 17).

Even where supports are provided, as in the case of refugee learners in the Kiron initiative (Germany), course completion statistics are troublesome. Approximately two-thirds of learners had not completed any online course after 10–15 months of studying with Kiron (Halkic & Arnold, 2019). The authors expound on the layers of challenges that confront many online learners:

> *Online education is by no means a straightforward solution for educational challenges ... [catering] for disadvantaged groups by use of educational technologies [is a] complex endeavor. The intricate needs, the life situations, the idiosyncrasies and, more often than not, the diversity of the target groups have to be considered as far as it can (re)produce social inequalities ... (Learners) who study online are still bound to their life situations with places and time budgets that might not be conducive for online studying* (p. 361).

These disproportionately high attrition rates among less-affluent groups of learners discussed earlier in this chapter may undercut one of the more compelling arguments for online learning—that it provides equitable access to learners for whom face-to-face learning is not an option (Burns, 2020a).

### Online learning has a "high status" problem

While some forms of distance education suffer from low status (for example, radio and IAI), online learning has the opposite problem—often undeservedly high status. It is often seen as an attractive option for national teacher distance education programs, even when countries lack the necessary infrastructure, connectivity, and inputs to ensure that online learning has any chance of succeeding. Questions about the readiness of a country's teachers to study online, the availability of robust infrastructural networks, the availability of qualified digital designers, online instructors, and digital resources often are overridden by policymakers' infatuation with all things digital. This bias toward online learning is frequently coupled with a failure to understand the cost, complexity, and time associated with robust telecommunications infrastructure, equity, quality, design, instruction, preparation, support, and development of digital materials.

While this section has essentially assessed the pros and cons of online learning, two challenges remain in terms of the merits or demerits of online learning for teacher professional development. The first has to do with self-sorting. With more options for professional development, teachers may arrange themselves into online, blended, or in-person modes of distance learning, thus making assessment of the real benefits and tradeoffs of purely online versus blended or in-person learning more difficult.

The second is around expectations. Online learning, for all its promise, is not a panacea and will not fix the logistical, financial, and human resource problems that beset teacher training programs. Online learning cannot fix recruitment and selection of poorly qualified teachers. It cannot fix low-quality pre-service and in-service education programs; expecting that an online intervention can do so is folly. Rather, it just disseminates, indeed scales, poor quality programming to more teachers. Online education initiatives stand a greater chance of success when all elements of the education system—standards, curriculum, assessment, supervision, leadership, etc.—are developed, coherent, and horizontally aligned throughout the education system. In far too many systems this is not the case.

## 5.9 Summary of Online Distance Education

Online learning resurfaces throughout this guide, most notably in Chapters 9 and 11-19 in Section II of this guide. Figure 5.9 summarizes the role of online learning and its strengths and limitations as a mode of teacher distance education.

**Figure 5.9**
**Overview of Online Learning for Teacher Education**

| Roles in Teacher Professional Development | Strengths | Limitations |
|---|---|---|
| • Online learning blends all modalities of distance education—print, audio, visual, multimedia—with real-time communication.<br>• It is used for pre-service, in-service, and continuing education for teachers (for example, for renewing licensure or promotion).<br>• Online learning can provide structured and unstructured training and professional development for teachers.<br>• It can support formal and informal teacher learning.<br>• Online mentoring, online professional learning communities, computer-mediated communication, and social networking sites provide school-based coaching, mentoring, and follow-up for teachers.<br>• It provides teachers with access to learning resources that otherwise might be unavailable locally.<br>• Accredited online courses help teachers upgrade qualifications, participate in enrichment, or fulfill continuing education requirements and do so from their homes or schools.<br>• Social media allow teachers to collaborate and share ideas with distant peers. | • Online learning is convenient—any time, any place, any pace—as long as a teacher has Internet access.<br>• Asynchronous written communication (e-mail, discussion boards) can prompt more reflective and considered participation.<br>• Asynchronous online courses, social media, and MOOCs offer scale—they reach large populations of teachers.<br>• Many synchronous courses may be a worthwhile substitute to in-person learning.<br>• Online and blended coaching, mentoring, and communities have been shown to reduce isolation experienced by new teachers (one of the major contributors to teacher attrition).<br>• Online learning offers permanence—all materials and conversations can be archived; it leaves an electronic audit trail—teachers' use and activity can be monitored and quantified.<br>• Social media are typically free or low-cost, easy to use, engaging, and promote personal and participatory communication.<br>• The Internet allows teachers to tap into collective wisdom of "the crowd" and form their own professional learning communities.<br>• Social media and cloud-based applications help defray costs of expensive software licenses. | • High entry barriers: Teachers must have access to a computer and Internet, plus language and technology skills to successfully participate.<br>• Online learning depends on regular access to computers and the Internet.<br>• Policymakers and planners often see online learning as cheap and easy professional development, requiring limited personnel and support, when the opposite is true.<br>• Over 60% World Wide Web is in English with much of the remainder in Mandarin, Russian, Spanish and a handful of other languages. There are comparatively fewer limited local-language offerings online (Bhutada, 2021).<br>• Many self-paced online courses lack high-quality or interactive content.<br>• Issues of quality control still plague online offerings.<br>• Social media struggle with quality and accuracy: Expertise and quality assurance may give way to the "cult of the amateur" (Keen, 2007, as cited in Burns & Bodrogini, 2011).<br>• Social media also struggle with the prevalence of misinformation and disinformation. Teachers must have strong digital citizenship skills, and many do not.<br>• Many formerly free SaaS sites have become monetized (e.g., *VoiceThread*) and former popular educational social networking platforms have been closed and content lost (e.g., *Edmodo*). |

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## References

Acosta, A., Palmer, I., & Romo-González, L. (2021). *Back to basics: Quality in digital learning.* New America: Education Policy. https://www.newamerica.org/education-policy/reports/back-to-basics/

Alpert, W., Couch, K., & Harmon, O. (2016). A randomized assessment of online learning. *American Economic Review, 106*(5), 378–82. doi:DOI: 10.1257/aer.p20161057

Amado, C., Dorotea, N., Pedro, A., & Piedade, J. (2022). MOOCs design: A conceptual framework for continuous teacher training in Portugal. *Education Sciences, 12*(5). https://doi.org/10.3390/educsci12050308

Anderson, C. (2017, March 10). *Social media is not "social," It's media. Start Treating it that way.* Medium. https://medium.com/on-advertising/social-media-is-not-social-its-media-start-treating-it-that-way-6cda5c39881a

Annual Status of Education Report Centre. (2021, November). *Annual status of education report (Rural) 2021.* Annual Status of Education Report. https://img.asercentre.org/docs/aser2021finalreport_16.116.54pm1.pdf

Arnao, Z. (2022, October 11). *Can data portability happen on video-sharing platforms?* Brookings. https://www.brookings.edu/blog/techtank/2022/10/11/can-data-portability-happen-on-video-sharing-platforms/

Asian Development Bank. (2022). *Falling further behind: The cost of COVID-19 school closures by gender and wealth.* Asian Development Outlook 2022 Special Topic. https://www.adb.org/sites/default/files/publication/784041/ado2022-learning-losses.pdf

Basantes-Andrade, A., Cabezas-González, M., & Casillas-Martín, S. (2020). Los nano-MOOC como herramienta de formación en competencia digital docente. *Revista Ibérica de Sistemas e Tecnologias de Informação, e32*, 202–214. https://www.researchgate.net/profile/Marcos-Cabezas-Gonzalez/publication/344682098_Los_nano-MOOC_como_herramienta_de_formacion_en_competencia_digital_docente/links/5f895d02a6fdccfd7b65671d/Los-nano-MOOC-

Bawa, P. (2016). Retention in online courses: Exploring issues and solutions—A literature review. *Sage Open*, *6*(1), https://doi.org/10.1177/2158244015621777.

Berry, S. (2017). *Educational outcomes of synchronous and asynchronous high school students: A quantitative causal-comparative study of online algebra 1.* Doctoral dissertation Northeastern University.

Bett, H., & Makewa, L. (2020). Can Facebook groups enhance continuing professional development of teachers? Lessons from Kenya. *Asia-Pacific Journal of Teacher Education*, *48*(2), 132–146. https://doi.org/10/gg3988

Bhutada, G. (2021). *Visualizing the Most Used Languages on the Internet*. Visual Capitalist. https://www.visualcapitalist.com/the-most-used-languages-on-the-internet/

Bird, K., Castleman, B., Song, Y., & Yu, R. (2022). *Is big data better? LMS data and predictive analytic performance in postsecondary education. (EdWorkingPaper: 22-647).* Annenberg Institute at Brown University. https://doi.org/10.26300/8xys-ym74

Blau, I., Weiser, O., & Eshet-Alkalai, Y. (2017). How do medium naturalness and personality traits shape academic achievement and perceived learning? An experimental study of face-to-face and synchronous e-learning. *Research in Learning Technology, 25*. https://doi.org/10.25304/rlt.v25.1974

Broadband Commission for Sustainable Development. (2021, September). *Connecting learning spaces: Possibilities for hybrid learning working group report.* Broadband Commission for Sustainable Development. https://broadbandcommission.org/publication/connecting-learning-spaces/

Burns, M. (2013, December). Staying or leaving? Designing for persistence in an online educator training program in Indonesia. *Open Learning: The Journal of Open and Distance Learning*, *28*(2), 141–152. doi: http://dx.doi.org/10.1080/02680513.2013.851023

Burns, M. (2020a, June 10). *Online education's COVID-19 Struggles*. UKFIET-The Education and Development Forum. https://www.ukfiet.org/2020/online-educations-covid-19-struggles/

Burns, M. (2020b, July 22). *Getting started with teaching online…again.* K–12 Talk: https://k-12talk.com/2020/07/22/getting-started-with-teaching-onlineagain/

Burns, M. (2021, March 24). *eLearning has improved in the last 7 years…What are the drivers of these changes?* eLearning Industry. https://elearningindustry.com/online-learning-has-improved-in-last-7-years

Burns, M. (in press). *Barriers and supports for technology integration: Views from teachers. Background chapter prepared for the global education monitoring report: technology and education.* United Nations Educational, Scientific and Cultural Organization.

Burns, M., & Bodrogini, P. (2011). The wisdom of practice: Web 2.0 as a cognitive and community-building tool in Indonesia. In M. Thomas (Ed.), *Digital education* (pp. 167–193). Palgrave Macmillan.

Burns, M., Santally, M., Halkhoree, R., Roopesh Sungkur, K., Juggurnath, B., & Banoor Rajabalee, Y. (2019, November). *ICTs in secondary education in Sub-Saharan Africa: Policies, practices, trends and recommendations.* MasterCard Foundation: Secondary Education in Africa: Preparing Youth for the Future of Work. https://mastercardfdn.org/wp-content/uploads/2019/11/ICT-in-Secondary-Education.pdf

Burroughs, A. (2021, December 15). *Holograms add depth to remote classes*. EdTech Magazine. https://edtechmagazine.com/k12/article/2021/12/holograms-add-depth-remote-classes

Cardim, J., Molina-Millán, T., & Vicente, P. (2021). *Can technology improve the classroom experience in primary education? An African experiment on a worldwide program. (No. wp2101).* Universidade Nova de Lisboa, Nova School of Business and Economics, NOVAFRICA. https://www.pedrovicente.org/profuturo.pdf

Castaño-Muñoz, J., Kalz, M., Kreijns, K., & Punie, Y. (2018). Who is taking MOOCs for teachers' professional development on the use of ICT? A crosssectional study from Spain. *Pedagogy and Education Technology, 27*(5), 607–624. doi:10.1080/1475939X.2018.1528997

Chigeza, P., & Halbert, K. (2014). Navigating e-learning and blended learning for pre-service teachers: Redesigning for engagement, access and efficiency. *Australian Journal of Teacher Education, 39*(11). http://dx.doi.org/10.14221/ajte.2014v39n11.8

Christensen Institute. (2022). *What is blended learning?* Blended Learning Universe. https://www.christenseninstitute.org/blended-learning/

Class Central. (2023, January 4). *Coursera courses*. Class Central. https://www.classcentral.com/provider/coursera

Coiro, J. (2014). Research on the effectiveness of online learning – A compilation of research on online learning. *Texto Livre: Linguagem e Tecnologia, 7*, 30–43. https://www.learningfront.com/Media/Research_Online_Learning.pdf

Commonwealth of Learning. (2008). *Education for a digital world: Advice, guidelines and effective practice from around the globe.* http://oasis.col.org/handle/11599/52

Conn, K. (2014). *Identifying effective education interventions in sub-Saharan Africa: A meta-analysis of rigorous impact evaluations* [Doctoral dissertation, Columbia University].

Contact North | Contact Nord. (2020, August 4). *A new pedagogy is emerging... and online learning is a key contributing factor.* https://teachonline.ca/tools-trends/how-teach-online-student-success/new-pedagogy-emerging-and-online-learning-key-contributing-factor

Conyers, A. (2020, August 13). How online learning is an opportunity for the Arctic. https://www.arctictoday.com/how-online-learning-is-an-opportunity-for-the-arctic/

Cormode, G., & Krishnamurthy, B. (2008). *Key differences between Web 1.0 and Web 2.0*. http://doi.org/10.5210/fm.v13i6.2125

Council of Europe. (2022). *Learning modules online (LEMON)*. Council of Europe Education. https://www.coe.int/en/web/education/section-3-lemon

Crawford, A. (2021, December 21). *Do-it-yourself education is on the rise: The number of homeschooled children is growing. Will that inspire innovations in traditional schools—or undermine their communal purpose?* Boston Globe. https://www.bostonglobe.com/2021/12/23/opinion/do-it-yourself-education-is-rise/

Dash, S., Magidin de Kramer, R., O'Dwyer, L., Masters, J., & Russell, M. (2014). Impact of online professional development or teacher quality and student achievement in fifth grade mathematics. *Journal of Research on Technology in Education, 45*(1), 1–26. https://doi.org/10.1080/15391523.2012.10782595

Data Reportal. (2023). *Digital around the world*. Data Reportal. https://datareportal.com/global-digital-overview

DeVynck, G., & Bergen, M. (2020, April 9). *Google classroom users doubled as quarantine spreads.* Bloomberg News. https://www.bloomberg.com/news/articles/2020-04-09/google-widens-lead-in-education-market-as-students-rush-online

Digital Learning Collaborative. (2020). *Snapshot 2020: A review of K–12 online, blended, and digital learning.* Digital Learning Collaborative.

Doolittle, P. (2014, May 21). Flipping the classroom: Leveraging technology in the design of instruction to foster student learning. *Teaching with Technology Symposium.* Tufts University.

Duncan-Howell, J. (2010). Teachers making connections: Online communities as a source of professional learning. *British Journal of Educational Technology, 41*(2), 324–340. doi:10.1111/j.1467-8535.2009.00953.x

Escueta, M., Nickow, A., Oreopoulos, P., & Quan, V. (2020). Upgrading education with technology: Insights from experimental research. *Journal of Economic Literature, 58*(4), 897–996. doi:10.1257/jel.20191507

Europass Teacher Academy. (2022). *Europass teacher academy*. https://www.teacheracademy.eu/

Fabriz, S., Mendzheritskaya, J., & Stehle, S. (2021, October). Impact of synchronous and asynchronous settings of online teaching and learning in higher education on students' learning experience during COVID-19. *Frontiers in Psychology, 12*, doi:10.3389/fpsyg.2021.733554

Fauville, G., Luo, M., Muller Queiroz, A., Bailenson, J., & Hancock, J. (2021). Nonverbal mechanisms predict Zoom fatigue and explain why women experience higher levels than men. *SSRN*, 1–18. http://dx.doi.org/10.2139/ssrn.3820035

Friday Institute. (n.d.). *Online professional learning courses*. The PLACE: Professional learning and colaboration environment. https://place.fi.ncsu.edu/local/catalog/section.php?id=1

Friedman, T. (2012, May 15). Come the revolution. *New York Times*. http://www.nytimes.com/2012/05/16/opinion/friedman-come-the-revolution.html

Garrett, R., Simunich, B., Legon, R., & Fredericksen, E. (2021). *CHLOE 6: Online learning leaders adapt for a post-pandemic world, The changing landscape of online education, 2021.* Quality Matters. https://www.qualitymatters.org/qa-resources/resource-center/articles-resources/CHLOE-6-report-2021

Gittell, R., & Vidal, A. (1998). *Community organizing: Building social capital as a development strategy.* Sage.

Global Education Monitoring Report Team. (2022). *Non-state actors in tertiary education: a shared vision for quality and affordability?* United Nations Educational, Scientific and Cultural Organization. https://unesdoc.unesco.org/ark:/48223/pf0000381613

Government of Greenland. (2019). *Greenland in figures 2019.* https://stat.gl/publ/en/GF/2019/pdf/Greenland%20in%20Figures%202019.pdf

Granovetter, M. (1973, May). The strength of weak ties. *American Journal of Sociology, 78*(6), 1360–1368. https://www.journals.uchicago.edu/doi/abs/10.1086/225469

Gray, J., & DiLoreto, M. (2016). The effects of student engagement, student satisfaction, and perceived learning in online learning environments. *International Journal of Educational Leadership Preparation*, *11*(1). https://files.eric.ed.gov/fulltext/EJ1103654.pdf

Green, K., Pinder-Grover, T., & Millunchick, J. M. (2012). Impact of screencast technology: Connecting the perception of usefulness and the reality of performance. *Journal of Engineering Education*, *101*, 717–737.

Halkic, B., & Arnold, P. (2019). Refugees and online education: Student perspectives on need and support in the context of (online) higher education. *Learning, Media and Technology, 44*(3), 345–364. https://doi.org/10.1080/17439884.2019.1640739

Hamad International Training Center. (2022). *E-Taleem*. E-Taleem Online Portal. https://etaleem.qa/

Harwell, D. (2022, October 14). *How TikTok ate the Internet*. Washington Post. https://www.washingtonpost.com/technology/interactive/2022/tiktok-popularity/

Hertz, A., Kochetkova, E., & Pflepsen, A. (2019). *Classroom observation toolkit for early grade reading improvement.* REACH, Global Reading Network. https://www.globalreadingnetwork.net/resources/classroom-observation-toolkit-early-grade-reading-improvement

Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, M. (2020). *The difference between emergency remote teaching and online learning.* Educause. https://er.educause.edu/articles/2020/3/the-difference-between-emergency-remote-teaching-and-online-learning

Horn, M. (2021). *A New Accountability Model for Alternative K-12 Schools.* American Enterprise Institute. https://files.eric.ed.gov/fulltext/ED616583.pdf

Hoxby, C. (2017). Online postsecondary education and labor productivity. In C. Hulten, & V. Ramey (Eds.), *Education, skills, and technical change: implications for future US GDP growth* (pp. 401–460). Chicago, IL: University of Chicago Press.

Impedovo, M., Malik, S., & Kinley, K. (2019). Global south teacher educators in digital landscape: implications on professional learning. *Research on Education and Media*, 19–28. doi:10.12783/dtssehs/icedde2019/33677

International Telecommunication Union. (2022). *Global connectivity report 2022.* https://www.itu.int/hub/publication/d-ind-global-01-2022/

Jaggars, S. (2011). *Online learning: Does it help low-income and underprepared students? (Assessment of evidence series).* Columbia Academic Commons. https://doi.org/10.7916/D82R40WD

Jiang, P., & Jiang, Y. (2022). Online live teaching is effective: An empirical study. *International Journal of Emerging Technologies in Learning, 17*(11). https://doi.org/10.3991/ijet.v17i11.28611

Jordan, K., & Mitchell, J. (2020). *Messaging apps, SMS & social media: Rapid evidence review.* doi:10.5281/zenodo.4058181

Kizilcec, R. F., Reich, J., Yeomans, M., Dann, C., Brunskill, E., Lopez, G., . . . Tingley, D. (2020, June 30). Scaling up behavioral science interventions in online education. *Proceedings of National Academy of Sciences of the United States of America*, *117*(26). https://www.pnas.org/content/117/26/14900

Kizilcec, R., & Halawa, S. (2015). Attrition and achievement gaps in online learning. *Proceedings of the second ACM conference on learning at scale*, (pp. 57–66). https://doi.org/10.1145/2724660.2724680

Kizilcec, R., Pérez-Sanagustín, M., & Maldonado, J. (2017). Self-regulated learning strategies predict learner behavior and goal attainment in massive open online courses. *Computers & Education, 104*, 18–33. https://doi.org/10.1016/j.compedu.2016.10.001

Kizuka, M. (2019). Teachers, teacher educators and teacher education in the digital era: Future directions of continuing professional development and the way forward. *Journal of Sustainable Development Education and Research*, *3*(1), 15–22. https://doi.org/10.17509/jsder.v3i1.17169

Koenig, R. (2020, May 28). Pandemic may (finally) push online education into teacher prep programs. *EdSurge*. https://www.edsurge.com/news/2020-05-28-pandemic-may-finally-push-online-education-into-teacher-prep-programs

Krause, S. (2014). Why MOOCs? Five not-entirely-rhetorical questions about massive open online courses. *On Campus: The National Publication of American Federation of Teachers Higher Education Faculty and Professional Staff, 3*(2), 2–3.

Kuykendall, K. (2022, February 15). Teachers want more online, on-demand, and targeted professional learning opportunities, New survey shows. THE Journal. https://thejournal.com/articles/2022/02/15/teachers-want-more-flexible-and-more-targeted-professional-learning-opportunities

L'Agence Universitaire de la Francophonie. (2017). *L'Initiative francophone pour la formation à distance des maîtres (IFADEM).* L'Agence Universitaire de la Francophonie. https://www.auf.org/caraibe/nos-actions/toutes-nos-actions/linitiative-francophone-pour-la-formation-a-distance-des-maitres-ifadem/

Latchem, C., & Jung, I. (2010). *Distance and blended learning in Asia.* Routledge.

Laurillard, D. (2016, April). The educational problem that MOOCs could solve: Professional development for teachers of disadvantaged students. *Research in Learning Technology*, *24*, 1–17. https://doi.org/10.3402/rlt.v24.29369

Legodi, N. (2021, December 14). *Unisa reflects on the year that has been*. UNISA. https://www.unisa.ac.za/sites/corporate/default/News-&-Media/Articles/Unisa-reflects-on-the-year-that-has-been

Lowenthal, P., Snelson, C., & Perkins, R. (2018). Teaching massive, open, online, courses (MOOCs): Tales from the front line. *The International Review of Research in Open and Distributed Learning*, *19*(3). https://doi.org/10.19173/irrodl.v19i3.3505

Malkin, A., Rehfeldt, R., & Shayter, A. (2018). An investigation of the efficacy of asynchronous discussion on students' performance in an online research method course. *Behavior Analysis in Practice*, *11*(3), 274–278. https://doi.org/10.1007/s40617-016-0157-5

Maloney, E. (2007, January). What Web 2.0 can teach us about learning. *The Chronicle of Higher Education*, *53*(18), B26.

Mann, J., & Henneberry, S. (2014). Online versus face-to-face: Students' preferences for college course attributes. *Journal of Agricultural and Applied Economics*, *46*(1), 1–19. doi:10.1017/S1074070800000602

Marsick, V., & Watkins, K. (1990). *Informal and incidental learning in the workplace.* Routledge.

Martin, F., Ting, S., & Westine, C. (2020a). A systematic review of research on online teaching and learning from 2009 to 2018. *Computers & Education*, *159*, 1–17. https://doi.org/10.1016/j.compedu.2020.104009

Martin, F., Polly, D., & Ritzhaupt, A. (2020b, September 8). *Bichronous online learning: Blending asynchronous and synchronous online learning*. EDUCAUSE. https://er.educause.edu/articles/2020/9/bichronous-online-learning-blending-asynchronous-and-synchronous-online-learning

Mayr, A., & Oppl, S. (2022). Higher education at the margins—success criteria for blended learning systems for marginalized communities. *Education and Information Technologies*, 1–39. https://doi.org/10.1007/s10639-022-11282-3

McAleavy, T., Hall-Chen, A., Horrocks, S., & Riggall, A. (2018). *Technology-supported professional development for teachers: Lessons from developing countries.* Education Development Trust. https://www.educationdevelopmenttrust.com/EducationDevelopmentTrust/files/34/3463d85a-031c-4f1e-9002-969b4daf4cdf.pdf

McCormick, C. (2018). *Online learning: Investigating the impact of asynchronous and synchronous communication, on the students of color.* (ProQuest No. 10830262) Doctoral dissertation, Wingate University. https://www.waketech.edu/sites/default/files/page-file-uploads/Online_Learning_Investigating.pdf

McKnight, K., Hustedt, B., & Dilig, R. (2022). *Evaluation of the quality holistic learning pilot project: Report prepared for the Center for Professional Learning at Childhood Education International.* RTI International: Center for Research, Evaluation, and Equity in Education; Center for Education Survey Research & Analysis.

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies.* United States Department of Education.

Mollenkamp, D. (2022, August 16). *Popular K–12 tool Edmodo shuts down*. EdSurge. https://www.edsurge.com/news/2022-08-16-popular-k-12-tool-edmodo-shuts-down

Molnar, A., Miron, G., Barbour, M., Huerta, L., Shafer, S., Rice, J., . . . Boninger, F. (2021). *Virtual Schools in the U.S.* National Education Policy Center. https://nepc.colorado.edu/sites/default/files/publications/RB%20Virtual%20Schools%202021.pdf

Moore, M. (2013). The theory of transactional distance. In M. Moore (Ed.), *Handbook of distance education* (pp. 84-103). Routledge.

Morris, E., Farrell, A., & Venetis, E. (2021, January). *A roadmap for for measuring distance learning: A review of evidence and emerging practices.* United States Agency for International Development. https://www.edu-links.org/sites/default/files/media/file/Measuring%20Impact%20and%20Outcomes_Final_01.20.2021-508%20%281%29.pdf

National Center for Education Statistics. (2022). *Reading and mathematics scores decline during COVID-19 pandemic.* Nations Report Card. https://www.nationsreportcard.gov/highlights/ltt/2022/

Nieuwoudt, J. (2020). Investigating synchronous and asynchronous class attendance as predictors of academic success in online education. *Australasian Journal of Educational Technology*, *36*(3), 15–25. https://doi.org/10.14742/ajet.5137

O'Dwyer, L., Carey, R., & Kleiman, G. (2007). A study of the effectiveness of the Louisiana algebra 1 online course. *Journal of Research on Technology in Education*, *39*(3), 289–306. doi:10.1080.15391523.2007.10782484

O'Dwyer, L., Masters, J., Dash, S., De Kramer, R., Humez, A., & Russell, M. (2010). e-Learning for educators. Effects of on-line professional development on teachers and their students: Findings from four randomized trials. *Technology and Assessment*, 1–87. https://www.bc.edu/research/intasc/PDF/EFE_Findings2010_Report.pdf

Ogbonna, C., Ibezim, N., & Obi, C. (2019). Synchronous versus asynchronous e-learning in teaching word processing: An experimental approach. *South African Journal of Education*, *39*(2), 1–15. https://hdl.handle.net/10520/EJC-168a98cd12

Oliveira, P., Cunha, C., & Nakayama, M. (2016, August). Learning management systems (LMS) and e-learning management: An integrative review and research agenda. *Journal of Information Systems and Technology Management*, *13*(2), 157–180. https://doi.org/10.4301/S1807-17752016000200001

Organisation for Economic Co-operation and Development. (2022a). *Education GPS*. http://gpseducation.oecd.org

Organisation for Economic Co-operation and Development. (2022b). *Distribution of teachers by age and gender*. OECD. Stat. https://stats.oecd.org/Index.aspx?DataSetCode=EAG_PERS_SHARE_AGE

Paudel, P. (2021). Online education: Benefits, challenges and strategies during and after COVID-19 in higher education. *International Journal on Studies in Education (IJonSE)*, *3*(2), 70–85.

Paul, J., & Jefferson, F. (2019, November). A comparative analysis of student performance in an online vs. face-to-face environmental science course from 2009 to 2016. *Frontiers in Computer Science*, *7*. https://doi.org/10.3389/fcomp.2019.00007

Pérez Sánchez, L., Jordano de la Torre, M., & Martín-Cuadrado, A. (2017, December). Los NOOC para la formación en competencias digitales del docente universitario. Una experiencia piloto de la Universidad Nacional de Educación a distancia (UNED). *Revista de Educación a Distancia*, *55*(1), 1–35. http://dx.doi.org/10.6018/red/55/1

Pota, V., Hennessy, S., Koomar, S., Kreimeia, A., Zubairi, A., Aerts, C., & Gault, C. (2021). *Turning to technology: A global survey of teachers' responses to the COVID-19 pandemic*. T4. https://t4.education/t4-insights/reports/turning-to-technology

Queen Rania Foundation. (n.d.). *Edraak*. Queen Rania Foundation. http://edraak.org/en/about-us

Rapanta, C., Botturi, L., Goodyear, P., Guàrdia, L., & Koole, M. (2020, October). Online university teaching during and after the COVID-19 crisis: Refocusing teacher presence and learning activity. *Postdigital Science and Education*, *2*(3), 923–945. https://doi.org/10.1007/s42438-020-00155-y

Rizvi, S., Rienties, B., Rogaten, J., & Kizilcec, R. (2020). Investigating variation in learning processes in a FutureLearn MOOC. *Journal of Computing in Higher Education*, *32*(1), 162–181. https://doi.org/10.1007/s12528-019-09231-0

Robert, J. (2022, October 3). *2022 Students and technology report: Rebalancing the student experience.* EduCause. https://www.educause.edu/ecar/research-publications/2022/students-and-technology-report-rebalancing-the-student-experience/modality-preferences

Rockinson-Szapkiw, A. (2009). *The impact of asynchronous and synchronous instruction and discussion on cognitive presence, social presence, teaching presence, and learning.* (ProQuest No. 3370135) Doctoral dissertation, Regent University. https://www.proquest.com/openview/b28b33586a481425c1fde5f588038ff4/1?pq-origsite=gscholar&cbl=18750

Santally, M. (2016). An evaluation of the African leadership in ICT programme from a quality assurance perspective. *European Journal of Open, Distance and E-learning*, *19*(2), 114–128. https://files.eric.ed.gov/fulltext/EJ1138166.pdf

SCORM.com. (2022). *SCORM explained 101: An introduction to SCORM*. SCORM.com. https://scorm.com/scorm-explained/one-minute-scorm-overview/

Seaton, D., Coleman, C., Daries, J., & Chuang, I. (2014). Teacher enrollment in MITx MOOCs: Are we educating educators? *SSRN*. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2515385

Selwyn, N. (2007). Web 2.0 applications as alternative environments for informal learning – A critical review. *Paper for CERI-KERIS international expert meeting on ICT and educational performance*, (pp. 1–10). https://www.oecd.org/education/ceri/39458556.pdf

Shachar, M., & Neumann, Y. (2010). Twenty years of research on the academic performance differences between traditional and distance learning: Summative metaanalysis and trend examination. *MERLOT Journal of Online Learning and Teaching*, *6*(2). http://jolt.merlot.org/vol6no2/shachar_0610.pdf

Shah, D. (2021, December 28). *A decade of MOOCs: A review of stats and trends for large-scale online courses in 2021*. EdSurge. https://www.edsurge.com/news/2021-12-28-a-decade-of-moocs-a-review-of-stats-and-trends-for-large-scale-online-courses-in-2021

Sloan Consortium. (2008). *Staying the course: Online education in the United States.* Babson College.

Statista. (2022a, July). *Daily time spent on social networking by internet users worldwide from 2012 to 2022 (in minutes)*. https://www.statista.com/statistics/433871/daily-social-media-usage-worldwide/

Statista. (2022b, August 1). *Average price for 1GB of mobile data in Africa as of 2021, by country.* https://www.statista.com/statistics/1180939/average-price-for-mobile-data-in-africa/

Statista. (2022c, September). *Number of internet and social media users worldwide as of July 2022*. https://www.statista.com/statistics/617136/digital-population-worldwide/

Stutchbury, K., Chamberlain, L., & Amos, S. (2019). Supporting professional development through MOOCs: The TESSA experience. *Pan-Commonwealth Forum 9 (PCF9).* Commonwealth of Learning. http://hdl.handle.net/11599/3340

Sun, Z., Lin, C., Wu, M., Zhou, J., & Luo, L. (2018, August). A tale of two communication tools: Discussion-forum and mobile instant-messaging apps in collaborative learning. *British Journal of Educational Technology*, *49*(2), 248–261. https://doi.org/10.1111/bjet.12571

Tait, A. (2022, September 6). *The tricky ethics of being a teacher on TikTok*. Wired. https://www.wired.com/story/teachers-on-tiktok/

Traxler, J., & Ogange, B. (2021). *Policy brief: Leveraging MOOCs for teacher development in low-income countries and disadvantaged regions.* Commonwealth of Learning. http://hdl.handle.net/11599/3980

Uzun, D. (2022). *EFL teachers' perceptions of bichronous online teaching* [Doctoral dissertation, Bilkent University]. http://repository.bilkent.edu.tr/handle/11693/77845

Weingarten, R. (2014). Technology is no substitute for faculty-student engagement. *On Campus: The National Publication of American Federation of Teachers Higher Education Faculty and Professional Staff*, *3*(2), 1.

Xie, H., Liu, W., & Bhairma, J. (2018). Analysis of synchronous and asynchronous e-learning environments. *2018 Third Joint International Information Technology, Mechanical and Electronic Engineering Conference* (pp. 270–274). Atlantis Press. https://www.atlantis-press.com/proceedings/jimec-18/55911410

Yuan, Y., & Gay, G. (2006). Homophily of network ties and bonding and bridging social capital in computer-mediated distributed teams. *Journal of Computer-Mediated Communication*, *11*(4), 1062-1084. https://doi.org/10.1111/j.1083-6101.2006.00308.x

Zajonc, R. (1968). Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology*, *9*(2), 1–27. https://doi.org/10.1037/h0025848

Zhao, F., Fu, Y., Zhang, Q., Zhou, Y., Ge, P., Huang, H., & He, Y. (2018). The comparison of teaching efficiency between massive open online courses and traditional courses in medicine education: A systematic review and meta-analysis. *Annals of Translational Medicine*, *6*(23). doi:10.21037/atm.2018.11.32

Zhao, Y., Lei, J., Lai, B., & Tan, H. (2005). What makes the difference? A practical analysis of research on the effectiveness of distance education. *Teachers College Record*, *107*(8), 1836–1884. https://citeseerx.ist.psu.edu/document?repid=rep1&type=pdf&doi=a1c7938dd1c674ac58ec068197a108058b9af60e

Section I. Chapter 6

# MOBILE-BASED DISTANCE LEARNING

## Table of Contents

Many of the features and functions available on more complex and expensive computers can increasingly be found on mobile devices.

Mobile devices, in the form of tablets and smart phones, have had a transformational impact on teacher learning. Each successive generation of mobile networks—from 1G to 5G—has allowed teachers to receive voice and text support from coaches; access Internet teaching resources via broadband data; communicate with peers via voice, text, and Voice over Internet Protocol (VoIP); stream teaching videos; participate in synchronous online classes; and unicast and broadcast lessons to students and teacher colleagues during COVID-19 pandemic school closures.

With 92% of the world's population in possession of a mobile phone (84% of which are smart phones), it's fair to say that, like radio and television, mobile phones are a technology teachers own and know how to use (Bank My Cell, 2022). GSMA, an industry organization representing the interests of mobile network operators worldwide, estimates that as of 2021 there were 4.2 billion global mobile Internet subscribers and that the coverage gap—the percentage of population living outside of areas covered by mobile broadband networks—had fallen to 6% (GSMA, 2022, p. 2).

As will be seen in this chapter, mobile technologies have become indispensable tools for teacher learning. Their greatest value may be that they circumvent traditional barriers to technology adoption. Where laptops can be expensive, mobile phones are more affordable. Where Internet access can be both limited and inconsistent, phones take advantage of more ubiquitous cellular networks. And where computers and various software applications may have steep learning curves, phones, tablets, and the apps that power them are far easier to learn and use. These relative advantages in terms of access, cost, and ease of use translate into potential opportunities for mobile learning or "m-learning"[1] for teachers that are flexible, portable, networked, and ubiquitous (at least where there is cell phone coverage).

Mobile technologies have provided an alternative way to engage teachers in ongoing learning and support. They can deliver text, audio, video, multimedia (both simple and more complex, such as digital learning games); they can be used with the five modes of distance education already discussed in this guide; and the abundance of educational applications developed for mobile platforms makes them a highly promising mode of teacher professional development. As will be discussed in detail in this chapter, governments, broadcasters, non-governmental organizations, and educational institutions have capitalized on the availability of mobile devices and ubiquitous networks to provide pre-service and in-service teacher teachers with content, instruction, support, and guidance. But, as will also be

[1] Also referred to as "u-learning" for ubiquitous learning.

discussed in this chapter, mobile technologies are not a silver bullet, and they suffer from intrinsic design weaknesses that can dilute their potential for professional learning.

Though "mobile technologies" encompass an array of handheld devices (and laptops), this chapter focuses exclusively on digital tablets and in particular on smart phones.

## 6.1 The Mobile Learning Environment: Apps, Tablets, and Phones

We begin by exploring the core elements of the mobile learning ecosystem: hardware (tablets and phones) and apps.

## 6.2 Hardware: Digital Tablets and Phones

### 6.2.1 Digital Tablets

Digital tablets2 include the iPad and other touch-screen portable devices such as Samsung tablets. (Figure 6.1 outlines the digital tablet's origin story and the dramatic impact tablets have had on education.) While most of the research on tablets focuses on their use by *students*, providing tablets to teachers has been a core technology activity of many governments, such as those of Brazil, Cabo Verde, Ireland, and Turkey (Burns, in press; Burns et al., 2019; Trucano, 2015). Such dissemination has provided a range of benefits to teachers, helping them to get oriented to technology, search for information, teach via tablets (using a smart pen and Interactive Whiteboard), and introducing blended learning (via tablet stations).

**Figure 6.1**
**The iPad**

For a device that is barely more than a decade old (debuting in 2010), digital tablets have had a profound effect on how educational content is stored, displayed, and communicated.

The first tablet was Apple's iPad—essentially a hybrid iPhone and laptop, with a 7- to 10-inch screen, built-in wireless, and Internet networking for "always on" Internet connectivity, dual cameras for videoconferencing, and the ability to print over a Wi-Fi network. More striking than its dual functionality as a consumption and productivity tool was its form. It was lightweight and sleek, with a high-resolution LCD display powered primarily by touch and gestures.

The iPad, and its competitors, changed educational technology in multiple ways. Suddenly learners, too young to use a laptop, could instead navigate a world of engaging experiences via a touchscreen. The iPad shifted the paradigm of textbooks from one-dimensional print products to tablet-stored multimedia, immersive environments, and interactive content. Tablets redefined hardware design as touch-screen navigation largely replaced pointing and clicking (Remember the mouse?). They changed how we interact with the Internet—more through apps and less through the World Wide Web. They put technology in the hands of poor students: Kenya, Cabo Verde, Fiji, Peru, Trinidad and Tobago, Jamaica, Antigua, and Botswana are but a few of the countries that have provided tablets to a substantial portion (or all) of their student body (Burns et al., 2019; Nyamai, 2020; Sauvakacolo, 2022; UNICEF Latin America and the Caribbean Section, 2020).

These features have *not* necessarily translated into improved learning, however. A 2018 survey of more than 340,000 students in 51 countries showed that students who used tablets consistently underperformed peers who used laptops or used other types of technology configurations (Bryant et al., 2022).

[2] This is another example of the lexical variability that pervades the technology world. There are also "tablet PCs," such as the Surface Pro, that are slightly larger than an Apple or Samsung tablet and have the full functionality of a personal computer (PC). Users can input information via a keyboard or stylus. The digital tablets discussed in this chapter, like Apple or Samsung tablets, are touch-screen devices that are computer-like, but not intended to run a full PC operating system or a complete set of applications with the full functionality of a PC.

But, more importantly for purposes of this chapter, the provision of tablets to teachers has allowed them to engage in more self-directed, personalized, and differentiated professional learning. For many teachers, their tablet has become their own personalized professional learning device, which they use to access their own personal learning network (PLN) and customized menu of professional learning opportunities (Burns, in press).

### 6.2.2 Mobile Phones

Despite the use of tablets, the real potential of mobile learning for teachers rests with phones. This guide distinguishes between feature phones and smart phones. A feature phone is a mobile phone that has more features than a standard "dumb" or "flip" cellphone but is not equivalent to a smartphone. Such phones can make and receive calls, send text messages (SMS), and offer some of the advanced features found on a smartphone, such as some apps and some degree of Internet access. They are less expensive than smart phones.

Even the lowest end feature phone—simple voice- and text-enabled phones (also called dumb phones)—have demonstrated that they can, either alone or in tandem with other forms of distance education, be used as teacher education tools to deliver content and instruction, connect teachers to peers and facilitators, and/or provide in-class support mechanisms.

But the real power of mobile phones lies with smart phones. Essentially mini-computers, they allow users to engage with all of the distance education modalities mentioned in the previous chapters—read, listen to audio, watch videos, engage with multimedia, VR and AR-based activities, watch TV programs, surf the Internet—plus make voice calls and send text messages. Their real design strengths, besides size and ease of use, are that they are location-aware, have multi-touch screen capabilities, and are powered by "mini-applications" or "apps."

## 6.3 Software: Apps

It is impossible to discuss mobile learning without first focusing on the apps that power mobile technologies. Apps are mini applications, originally designed to run on smartphones and tablets and perform one task or a small set of tasks. Applications, in contrast, are software designed to perform a variety of tasks requiring lots of memory. They typically run on desktops or laptops. Like most technology products, "apps" and "applications" have converged—at least in terminology.

Figure 6.2 provides a basic overview of apps. As can be seen, some apps are Web-based desktop or mobile apps; others work for mobile and Web applications only; and some exist in all four forms. For instance, Microsoft *Office* can be accessed via a Web browser, a desktop application, a mobile app, or via the cloud but with a desktop interface.

There are broadly four types of apps used in education—social media apps, communication apps, work delivery apps, and educational apps—and teachers use them all. These may include using *Twitter* to follow a favorite educator, *Kahoot* for quizzes, *Remind* to help students remember the due date of an assignment, or *Calendly* to schedule parent-teacher meetings.[3] Smart phones, and especially tablets with touch screens, have catapulted the popularity of educational apps among students, teachers, and parents and transformed apps into a fixture in the landscape of pre-primary and primary classrooms across the globe.

[3] See *Common Sense Media* rankings of the best education apps for Apple devices: https://www.commonsense.org/education/top-picks/best-1-to-1-ipad-apps-for-learning and for Android devices: https://www.commonsensemedia.org/lists/best-android-apps-for-kids

Figure 6.2
Overview of Apps (adapted from Karch, 2021)

| Type of App | Characteristics | Runs on... | Example |
|---|---|---|---|
| **Web-based apps** | • Run in browsers (such as *Chrome*)<br>• Typically lightweight, versus full, versions<br>• Many come with full set of features that require Internet connection and browser to leverage those features | • Desktops/ laptops<br>• Tablets<br>• Phones<br>• Smart watch | • *Chrome* extensions<br>• *Google* Apps for Education<br>• *Gmail*<br>• Microsoft *Office* |
| **Desktop apps (applications)** | • Designed for and work best on computers (mouse/keyboard interactions and large display)<br>• Typically have lots of features and manage large amounts of data<br>• Can be hybrid, with an online (cloud) version or offline version<br>• Designed to operate on a specific platform (Windows, iOS) | • Desktops/laptops<br>• Sometimes tablets and phones<br>• Internet browser | • Microsoft *Office*<br>• Adobe *Photoshop*<br>• Microsoft *Outlook*<br>• ARC GIS |
| **Mobile apps** | • Designed for smartphones and touch inputs<br>• Lightweight, versus full, versions (See, for example, *Gmail*, MS *Word*) | • Phones<br>• Tablets<br>• Smart watch | • *Gmail*<br>• Adobe *Sketch*<br>• *Duolingo*<br>• Microsoft *Office* |
| **Hybrid Apps** | • Offline desktop interface<br>• Direct access to hardware and other connected devices<br>• Always-on connection to Internet for quick updates and access to Internet resources | • Desktop<br>• Laptop<br>• Tablet<br>• Phone and browser | • Microsoft *Office*<br>• *Dedoose*<br>• *Twine* |

## 6.3.1 Offline Apps: Getting Content to Teachers[4]

Apps are great if teachers have access to them—but this is not always the case. While Internet access rates are rising globally, many parts of the globe suffer from low rates of Internet penetration. For example, fewer than 30% of Sub-Saharan Africans have Internet access (World Bank and International Telecommunication Union, 2022). Even if people use smart and feature phones, they are confronted with high data costs to access digital content. Thus, a number of initiatives have attempted to help teachers access apps and other content when offline.

### Tools to download online content

Downloading online content makes it available offline. Open-source platforms, such as *Kolibri*, provide offline access to a curated library of open-licensed educational content with tools for pedagogical support. The popular, phone-based app *Ustad* allows users to access content

[4] This chapter discusses apps and mobile content. Chapter 12 discusses digital content for other modes of distance education.

offline, brand their site (so a school could create a logo and essentially a landing page in *Ustad*) and, if users are near one another, share content. RTI International's open-source platform, *Tangerine Vanilla*, though used for assessment, also allows teachers to import and create content for offline use (C. Strigel, personal communication, July 18, 2022).

The Raspberry Pi and Orange Pi,[5] both fairly low-cost, credit-card–sized computers that plug into a computer monitor or TV, allow teachers to access and cache rich and interactive websites and content (BRCK Education, 2015). Websites and tools, such as *eGranary Digital Library*,[6] *HTTrack*, and *BluPoint* allow teachers to cache digital content, download Web content and store it locally, or provide digital offline technology for free to educators and allow use of digital content even when there is no Internet available (Burns, 2021; The World Bank Group, 2021).

### Preloaded content via phones and tablets

Offline tablet initiatives, such as, Kenya-based *KioKit* (part of BRCK Education) and *e-Limu* offer access to pre-loaded content on tablets or phones in areas where there is no Internet access. The Instant Network Schools (INS) program, developed by the United Nations High Commissioner for Refugees (UNHCR) in partnership with the Vodafone Foundation, provides offline digital educational content via tablets to 126,00 refugee students and 1,600 teachers in the Democratic Republic of the Congo (DRC), Egypt, Kenya, Mozambique, South Sudan, and Tanzania. Teachers and students download these resources via the Internet at community hubs and then access them offline via the local area network (Vodafone Foundation, 2021).

One of the most successful tablet-apps initiatives may be *onetab*, from the U.K.-based nonprofit, onebillion. Through *onetab*, an offline, customized Android tablet, students interact with *onecourse*—a set of adaptive, local-language literacy and numeracy learning apps, largely for self-instruction. The initiative first began in Malawi,

**Figure 6.3**
**Stepping Stone**

*Stepping Stone*, created by Education Development Center, is a growing suite of apps built on a single, open-source platform, designed to create mobile learning experiences for Android devices. It was the first mobile learning app maker designed specifically for diverse contexts in the Global South and requires no coding skills to create content. It incorporates audio, video, animation, and text files into apps. Content authors can create content on the *Stepping Stone* authoring site, which can then be downloaded by these apps to run offline. If downloads to mobiles are not possible, content can be packaged on a computer and imported to a device via a USB drive. Content can be preloaded on donated devices or distributed to existing tablets or Android phones via micro-SD cards. The activities stimulate engagement, illustrate application of ideas and methods, and promote active practice by users.

To date, *Stepping Stone* has been used in 2,000 Zambian schools. A 2017 RCT of 619 Zambian students involving three arms (one receiving *Stepping Stone*; a second getting *Stepping Stone* and worksheets; and a third serving as a control group) showed that both treatment groups led to strong gains and a significant reduction in zero scores among readers of an oral passage. While the Worksheet group showed significance at $p<.05$, the *Stepping Stone*-only group was highly significant at $p<.001$. Effect sizes were small (0.06) for the Workbook schools versus moderate (0.42) for the *Stepping Stone* schools. Additionally, providing *Stepping Stone* training phones to all schools for a further two years raised the rate of emerging readers to 9% nationwide (Richmond & Vinagradova, 2017).

[5] For a comparison of the two, see https://www.educba.com/orange-pi-vs-raspberry-pi/
[6] Thus far, this is available only to teachers and students in India, Pakistan, and Bangladesh.

and currently operates under a variety of names in Tanzania, Sierra Leone, Nepal, and Brazil—and, in a rare case of Global South to Global North transfer, in Canada, the United States, and the United Kingdom (onebillion, 2022). A number of studies[7] point to the effectiveness of *onecourse* apps on student achievement in math and English (Outhwaite et al., 2017; Pitchford et al., 2019).

### Content via SD cards and SMS

Transmitting content via a high-capacity memory card is another route for getting content to teachers. South Africa's Department of Basic Education (DBE) has distributed its national curriculum to teachers in rural areas via a secure digital (SD) card, as have such initiatives as Puerto Rico's Technology Application in Mathematics Teaching (Aplicación de la Tecnología en la Enseñanza de las Matemáticas [ATEMA]), which uses Khan Academy videos to help teachers improve math instruction in grades 4–8 (Rivera et al., 2022). In Papua New Guinea, the SMS Story project leveraged text messaging to provide stories and lesson plans to teachers in rural and low-resource settings with limited access to textbooks (Miao et al., 2018).

### Content creators

App makers and commercial and open-source eLearning platforms, such as Articulate *Storyline* and *H5P*, respectively, allow digital designers to make digital content, apps, and games accessible in an offline format, provided it doesn't contain links to the Internet. Through easy-to-use app creators, such as open-source toolkits like the previously mentioned *Ustad*, teachers can create

**Figure 6.4**
**Text2Teach**

Cell phones aren't just content repositories, they also are display devices. For example, in Bangladesh's national English in Action initiative (discussed later in this chapter), teachers received SD cards with hundreds of audiovisual and text-based teaching resources—and they also received battery-powered portable speakers and projectors that connect to phones so students could hear and watch English programming (McAleavy et al., 2018). EDC's USAID-funded Literacy, Language, and Learning (L3) Initiative in Rwanda (2011–2017) did something similar, connecting IAI-loaded phones to speakers for purposes of audio instruction.

One of the most enduring examples of phones as display devices is Text2Teach, initiated in the Philippines in 2003 as Bridge IT. It was designed to reach underfunded and neglected state primary schools and their communities in the Philippines, especially those in remote areas, and to standardize the quality of instruction in these schools through high-quality multimedia.

Text2Teach provides full-access interactive multimedia packages in English, science, and mathematics for Grades V and VI pupils as well as quality training to teachers. Teachers are given cell phones with pre-installed multimedia and video clips; a 29-inch color television; print-based teacher guides and folios in English, science, and mathematics V and VI, and face-to-face training. Phones are connected to television via cable, and the teacher uses the multimedia and video and follows the guide as he or she teaches the lesson.

Implemented by the Text2Teach Alliance, composed of Nokia, Ayala Foundation, Globe Telecom, SEAMEO INNOTECH, local government units, and the Philippines Department of Education, the program is still in existence. However, rigorous data about it are hard to come by. As of 2014, Text2Teach had been used with almost 4,000 teachers and approximately 310,000 students in 897 Filipino primary schools. Students improved in math and science; teachers displayed improved competence in using technology and a more positive attitude toward technology as a teaching tool (GSMA, 2014; Robles, 2018).

[7] Onebillion has an extensive list of evidence-based studies that can be found on its Web site: https://onebillion.org/impact/evidence/

customizable m-learning content such as audio, video, quizzes, and games for smartphones and tablets. Another such tool, *Stepping Stone*, is profiled in Figure 6.3.

### Commercial apps

Many school systems, and many of the initiatives above, may depend on commercial educational apps or free versions thereof, typically purchased through Google *Play* or Apple's App Store, that can be run online or in a hybrid form. These apps may have numerous benefits—they are frequently professionally designed, combine entertainment with learning, are easy to use, promote interactivity, offer academic assistance, and learners find them engaging (Menon, 2022). But despite the prevalence of such apps in schools across the world, many, if not most, of these products are unregulated and untested for learning in any meaningful way and there have been few comprehensive reviews of the educational quality of children's apps marketed with a variety of educational objectives (Hirsh-Pasek et al., 2015; Meyer et al., 2021).

In one of the only studies examining educational apps, Meyer et al. (2021) analyzed 100 children's educational apps with the highest downloads from Google *Play* and the Apple App Store,[8] as well as 24 apps most frequently played by preschool-age children. Each app received a score of 0–3 on each of the following four "pillars"—active learning, engagement in the learning process, meaningful learning, and social interaction. Scores then were summarized and categorized according to cut-off scores. Overall scores were low across all four pillars. Free apps had significantly lower Pillar 2 (Engagement in Learning Process) scores (t-test, $p < .0001$) and overall scores (t-test, $p < .0047$) when compared to paid apps, due to the presence of distracting visual and sound effects and disruptive advertising. Half of the paid apps sampled, which parents may assume are of higher quality, scored in the lower-quality range (≤4). Only 7 of the 124 apps earned a total score greater than 8, suggestive of a higher quality educational experience in the app, and only two paid apps scored a 10. These results highlight the need for improved design of educational apps guided by developmental science (Meyer et al., 2021, pp. 1, 3, 9, 10).

Apps are discussed here at length because they are a critical content and instructional support for teachers. Outhwaite et al. (2019) suggest that apps that are grounded in learning science theory can "embody the principles of active, engaged, meaningful, and socially interactive learning with a specific learning goal [and] can provide numerous learning benefits for students" (p. 285). High-quality app-based instruction, like that used by onebillion, can standardize quality math and literacy instruction in both high- and low-income countries (Outhwaite et al., 2019). They can serve as individual and group-based self-study tools for students—and their teachers—particularly in areas where there is conflict, or where there are no teachers or only poorly trained ones.

## 6.4 Mobile Learning for Teachers

The tablet-based apps and associated digital content discussed above are primarily directed at student learning. But as reiterated throughout this guide, even content and experiences designed for students offer direct and indirect benefits to teachers. These transcend simply providing teachers with much-needed content and curriculum materials without the need for Internet. Some of the indirect benefits are enumerated in the following pages.

### 6.4.1 Instructional Supports

Apps can be used to support instruction. For example, employing onebillion's *onecourse*, teachers often connect the tablet to a projector and use the apps to support direct instruction. Granted, this is a small step, and still didactic, but at least it represents an incipient use of technology and a shift away from text on a chalkboard.

[8] At last count, in 2015, the number of educational apps in the Apple App Store exceeded 75,000 (Van Nostrand et al., 2022).

Tablet-based apps also facilitate teachers' shift from a unitary direct-instruction model toward more learner-centered approaches by introducing the concept of competitive and collaborative play as part of learning. Teachers may resist such group-based approaches because they lack sufficient learning materials, but students organized in small-to-medium groups interacting with well-designed subject-specific apps may alleviate such a concern. A combination of tablets with apps, professional development, and scripts or guided lessons could conceivably help teachers embrace a range of simple learner-centered pedagogies. As an example of this, see the description of *Text2Teach*, in Figure 6.4., which uses mobile phones in combination with TV to support teachers' evolving instructional practices.

App-based instruction also can relieve the teacher of the sole burden of teaching—the app is a digital co-teacher—and remove the sole burden of designing assessments since assessment is often is built into the app.

Further, apps also allow teachers to "blend" learning. For example, children can work in small groups with their tablet-based apps while the teacher individually tutors a small group of children who might benefit from such guidance (Outhwaite et al., 2019, p. 285). Or vice versa—app intervention might be particularly beneficial for low-achieving children requiring remediation or more personalized instruction, thereby freeing the teacher to provide whole-class instruction. Using a learning stations approach, teachers could set up multiple learning stations—one of which includes a tablet—through which groups of students rotate to complete an assignment. Blended approaches such as these can assist teachers in offloading the work of direct instruction of foundational knowledge and skills so that they can spend more of their time developing relationships with their students; introduce peer learning in the classroom; provide individualized support to students; and orchestrate activities that foster deeper learning. All of these activities represent an incremental step toward a classroom instructional model that is more self-directed, mastery-based, and includes blended learning versus one-size-fits-all, rote-based instruction (Arnett, 2021) and they are made possible by tablets loaded with educational apps.

Finally, as the example of *onecourse* suggests, instruction with interactive apps can significantly raise learning outcomes compared to standard pedagogical practice. Digital technology interventions that utilize high-quality, curriculum-based, interactive apps can effectively raise student achievement in early-grade reading significantly more than standard practice does (Pitchford et al., 2019, p. 5).

These are indirect benefits of apps and mobile technologies for teacher learning. But mobile technologies have a much greater direct impact on teacher learning, as the next section discusses.

### 6.4.2 Mobile Teacher Professional Development and Support

Across the globe—particularly in some of the world's poorest countries in Sub-Saharan, Africa, Asia, and Latin America—mobile learning increasingly has assumed a salient role in teacher professional development, particularly during COVID-19 pandemic school lockdowns.

Like online professional development for teachers in wealthy contexts, mobile professional development provides teachers in poorer contexts with access to information, experts, experiences, and resources that otherwise would be unavailable because of geographical constraints, lack of skilled teacher educators, and scarce professional development opportunities. Indeed, for billions of the world's citizens, including its teachers, computers and the Internet still are unaffordable and out-of-reach.

Thus, for many teachers, mobile-based professional development is a lifeline to learning. As the following examples show, many of the applications on mobile phone apps, such as social media,[9] messaging apps, video, and audio make for professional development that can be diverse, collaborative, personalized, and situated in teachers' places of learning. This learning often substitutes for formal face-to-face education or is designed to augment it.

### Basic literacy and numeracy

Teachers in many contexts may struggle with basic literacy and numeracy. Projet d'Alphabetisation à Base Cellulaire (Projet ABC), a long-running cell phone literacy project in Niger,[10] directed at adults, is an example of how the most basic features of a phone—its alphanumeric keypad—can help teachers develop literacy skills in the national languages they must teach but may not fully grasp.

In this model of mobile learning, phones were programmed with a digital curriculum in the local languages of Hausa and Zarma. Local facilitators, trained by Niger's Ministry of Education, taught the Projet ABC literacy curriculum. Using SMS, learners studied basic functional literacy and numeracy for three hours per day. In the first year of Projet ABC, they learned how to use the phones themselves, while in year two, they began to study a digital curriculum that included phonetic activities and varied texts that were used to develop literacy skills further (United Nations Educational, Scientific and Cultural Organization, 2015).

Two years after the end of the program, learners in Projet ABC villages had reading scores that were significantly higher than those in standard adult education classes, and women and younger students were better able to decode numbers. Aker & Ksoll (2020) attributed this to more active mobile phone usage in Projet ABC villages. These results suggest that short-term learning gains associated with technology can persist, especially if students have the opportunity to practice with that technology after the end of classes (Aker & Ksoll, 2020).11

### Basic skills for adults

Cell-Ed is a mobile learning program designed to teach adults essential skills—reading, writing, oral communication, numeracy, and work and social skills—via any type of mobile phone (basic models or smartphones), even without a data plan. It began in the U.S. and since has expanded to adults in Chile, Ghana, Kenya, and Nigeria. By taking courses provided by Cell-Ed over their mobile phones, people with low literacy skills can practice and enhance their skills.

The learning sequence works like this: Learners complete a pre-assessment to ensure they are placed in the appropriate course and the course is personalized for them. They begin the lesson—an audio introduction accompanied by a text message (SMS) on their mobile phone. The automated Cell-Ed "teacher" (a voice recording of a Cell-Ed live coach) explains the information contained in each SMS and students complete this lesson. The lesson is followed by an assessment in which learners respond to questions that have been texted to them, using vocabulary or grammar they have learned in the lesson. If learners pass, they are allowed to continue on to the next lesson; otherwise, Cell-Ed helps learners by sending additional instructions. A live Cell-Ed coach can step in and provide extra help via SMS or a conventional phone call, or they can use the app. As learners successfully complete each levelled task, they receive individual certificates (UNESCO Insititute for Lifelong Learning and Commonwealth of Learning, 2021, p. 48).

### Self-study in content areas

Phones and tablets increasingly serve as a distribution channel for content for self- and group-study. For example, many of the student-facing apps mentioned in the previous section also can be used as teacher training tools: game-based apps in which users virtually experience World War

[9] Social media was discussed at length in *Chapter 5: Online Learning* and will not be revisited in this chapter.

[10] The program was designed by the Fletcher School at Tufts University, funded by USAID, and implemented by Catholic Relief Services, CARE, and Helen Keller International.

[11] The researchers have continued this research with immigrant adults in Los Angeles, California.

II, apps that help users with mathematics, apps that allow users to download and read free books on a mobile device, and so on.

In the Indian state of Madhya Pradesh, TESS India has created responsively designed (i.e., designed for phones) adaptations of text-based OER materials and *YouTube* videos for self-study via micro-Secure Digital (SD) cards.[12] The 240,000 SD cards—one for every teacher in the state's primary schools—furnish teachers with professional learning materials that they can access as needed (McAleavy et al., 2018). Videos of Indian teachers using the same pedagogical methods in their classroom settings provide teachers with authentic models demonstrating principles of practice used in classroom teaching. TESS India also has created a set of text and video professional development apps for school leaders in order to encourage a whole-school approach to innovation (McAleavy et al., 2018).

The Democratic Republic of Congo's Ministry of Education has used *Stepping Stone* to deliver training to 77,000 teachers in all formal schools in the DRC (Richmond & Vinagradova, 2017). In Bangadesh, English in Action (discussed below) has also provided phone-based professional development materials to teachers of English, and the University of Puerto Rico enhances its in-person mentoring for teachers in the ATEMA project with phone-based SD cards that, in addition to the teaching materials mentioned previously, contain audiovisual and text-based resources for professional development in math instruction (Rivera et al., 2022).

### Pre-service teacher preparation

The Future Teacher Kit from the United Nations Educational, Scientific and Cultural Organization (UNESCO) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) is a mobile-based teacher training program that builds on the affordances and popularity of mobile phones and messaging platforms such as *WhatsApp, Telegram,* and *Signal* to provide teachers with a mobile-based training in 20 Caribbean countries and territories—Anguilla, Antigua and Barbuda, Aruba, The Bahamas, Barbados, Belize, British Virgin Islands, Cayman Islands, Curaçao, Dominica, Grenada, Guyana, Jamaica, Montserrat, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Sint Maarten, Suriname, and Trinidad and Tobago. Teacher "ambassadors" are trained to facilitate learning activities with teacher groups. Teachers receive training snippets and hands-on activities on their phones via messenger systems such as *WhatsApp*, *Telegram*, or *Signal,* or via interactive voice response (IVR). Within teacher peer-support groups, teachers prepare lessons, exchange administrative information and teaching resources, share their experience implementing the hands-on activities they've learned, and provide feedback to one another (UNESCO & GIZ, 2022).

### Language instruction

Across Sub-Saharan Africa, teachers must deliver instruction in a "national" language they may not speak—French, English, Xhosa, Swahili, or Portuguese. Many other teachers may lack the ability to read or write in any language. In such cases, mobile phones have proved to be especially suitable for language learning. Skill builders (e.g., Education Development Center's *Stepping Stone* platform), simple educational games, apps such as *Duolingo* and *Mondly* (mentioned in Chapter 4), and even the use of the alphanumeric functions of phones have been shown to successfully build the literacy and second-language acquisition skills of adult learners, including teachers (Aker et al., 2012; Jiang et al., 2021; Richmond & Vinagradova, 2017). A small study of Syrian refugee teachers in Lebanon and Sweden showed that teachers were able to improve language learning by using their phones to interact with apps,

[12] TESS-India materials are available in seven versions, one for each of the Indian states in which the program operates. The other six states also put videos on SD cards but on a smaller scale than in Madya Pradesh (F. Wolfenden, personal communication, October 12, 2022).

translation services, video (such as *YouTube*), and social media (Bradley et al., 2019).

English in Action (EIA), a joint project between the British Broadcasting Corporation (BBC), Cambridge Education, Mott McDonald, the Open University of the United Kingdom, and the Government of Bangladesh, may be the most well-known phone-based language instruction program in the world. EIA targeted the English-language competencies of 100,000 teachers as well as those of the general population. The core delivery system of English instruction to teachers was either through a simple voice call or by texting a four-digit code which allowed access to hundreds of two-to-three minute English-language audio phone-based lessons, audiovisual files, and quizzes, all aligned with the national English textbook. Content was updated weekly and was differentiated so learners could follow the course at their own speed. As of 2018, over two million Bangladeshis had accessed the 140 bilingual audio lessons that were available. The mobile phone lessons recognized the learner's phone number and so learners could resume from their previous stopping point the next time they called in.

A series of studies from 2011–2018 indicated improvements in English-language instruction, an increase in teachers' use of English during instruction, and "significant improvements" in teachers' English language skills since the original baseline test in 2010 (Walsh, 2011, as cited in Burns, 2015; Eyres et al., 2014, as cited in McAleavy et al., 2018; McCormick, 2018). Ninety-five percent of teachers surveyed reported that EIA had helped them improve their own language skills, and 90% felt that EIA positively affected their teaching (English in Action, 2018). Data such as these suggest that it may be a successful example of using low-cost technology (phones) to deliver high-quality professional development to teachers at scale (McAleavy et al., 2018, p. 33).

#### Access to online courses

In many contexts, mobile learning for teachers is essentially an extension of online learning—but on a smart phone or tablet. In countries where online learning is common and teachers have access to strong cellular networks and Internet, tablets, and smart phones, they may choose to access their online courses via these mobile devices. Given the popularity of mobile technologies, many, if not most, online courses for teachers are designed "responsively"—an approach to Web design that ensures that course content and interfaces work well on a variety of platforms (laptops, tablets, smart phones). Thus, as a teacher switches from her school laptop to her home tablet or smartphone to take part in her online course, the website should automatically switch to accommodate the resolution, screen size, image size, and the scripting abilities of that particular device.

### 6.4.3 Mobile Support and Coaching

Phone-based messaging apps, such as *WhatsApp* groups, have proven to be an important and popular lever in creating professional learning communities for teachers. This is particularly evident for refugee teachers such as those in Syria, Lebanon, Jordan, and Bangladesh, who use phones and social media to share teaching ideas and resources and to offer one another educational and emotional support (Burns, in press). The SMS and Multimedia Messaging Services (MMS) features of phones allow teachers to gather and share ideas about appropriate teaching tools and resources with external experts and with one another (Ekanayake & Wishart, 2014). The one-to-one and one-to-many communication abilities of mobile devices mean that they can help promote coaching that is both private, individualized, and personalized while and also being collaborative and public.

#### Teacher support groups during COVID-19 pandemic school lockdowns

The power of mobile learning for teacher support was perhaps most evident during COVID-19 pandemic school lockdowns. Teachers in countries as diverse as Ecuador, México, Honduras, the U.S., Ireland, South Africa, Sweden, Lebanon, and India extensively used *WhatsApp* to form spontaneous teacher support groups—mainly *within* schools but also *across* schools. The instant messaging and free voice call components of *WhatsApp* also helped them stay in touch with students (Burns, in press). So prevalent was teacher use of *WhatApp* during COVID-19 pandemic school lockdowns that numerous ministries of education pushed out teaching and learning materials to teachers via *WhatsApp* (Cobo et al., 2020).

### Professional learning communities: English in Latin America

There is ample evidence of the power of phones and social media in tandem promoting communities of learning. For example, EDC's English for Latin America (ELA), an interactive audio program that provides teachers with tools and lessons to teach English effectively, has since 2013 maintained *WhatsApp* groups for teachers in Honduras, the Dominican Republic, and Panamá. These groups streamline workflow—teachers are organized into one group where they can communicate with EDC and with each other and where documents, pictures, audio files, and videos can be shared with all teachers at once.

More critically, the community sharing aspect has pushed teachers toward greater implantation of ELA methodologies. One of the most compelling components of ELA is the segment including songs for learning English that sound like Latin American pop songs.[13] In *WhatsApp*, teachers share videos of how they've applied the ELA methodology in classes. Most parts of the world have some form of the reality television programs *The Voice* or *American Idol*; thus, the competitive nature of the shared songs makes such video sharing attractive, particularly in a platform that allows for wide sharing but is not completely public. The fact that videos are pushed to teachers' personal accounts means that teachers don't have to go to a site or page somewhere to see them. All of this is highly motivating. Teachers who might not otherwise be as willing to participate share things or do activities with their students because they see other teachers doing it. Via *Facebook*, students, parents, and teachers can access the videos (K. Yasin, personal communication, July 19, 2022).

Learning communities will be discussed again in greater detail in Chapter 15.

### Mobile mentoring in Kakuma Refugee Camp

Phones, combined with messaging apps, appear to represent a potentially powerful coaching and mentoring duopoly. In Kenya's Kakuma Refugee Camp (one of the world's largest), Teachers for Teachers—a joint initiative of Teachers College, Columbia University; the United Nations High Commissioner for Refugees (UNHCR); Finn Church Aid; and the Lutheran World Federation—takes refugee teachers (only a third of whom are formally trained to teach) through a series of face-to-face professional development workshops developed by the Refugee Teacher Working Group (RTWG) (Mendenhall et al., 2017, pp. 4, 5, 7; M. Mendenhall, personal communication, March 21, 2022).

Upon completion of the face-to-face workshops, all participating teachers are assigned a global mentor, who provides six months of online practical support. These mentors are recruited and trained through online webinars and connect on a regular basis with groups of four to five refugee teachers over *WhatsApp* and a private *Facebook* page to share experiences, offer teaching tips directly connected to the training through a mobile mentoring curriculum developed to complement the training pack, and problem-solve in real time on issues teachers face in the classroom (Mendenhall et al., 2017, p. 7). The mentors come from 18 countries, including graduate students at Teachers College, Columbia University (U.S.) who were themselves teachers. Safaricom Foundation provides all teachers with phones, airtime, and data (M. Mendenhall, personal communication, March 21, 2022).

[13] Learn more and hear some of the songs here: http://englishforlatinamerica.org/

The main topics of *WhatsApp* conversations focus on overcrowded classrooms, student attendance, and classroom management (Mendenhall et al., 2017, p. 8). Nearly half of teachers reported that they had successfully implemented activities shared within their *WhatsApp* groups; that *WhatsApp* can provide self-sustaining teacher professional development; and that mobile-based mentoring can be adapted and implemented in other crisis-affected contexts at a relatively low cost (McAleavy et al., 2018, p. 42). *WhatsApp* is also an attractive technology because users don't incur extra data costs to use it.

While *WhatsApp* faciltates the exchange of instructional support, more fundamental is the ability of messaging apps to facilitate basic communication between communities and individuals experiencing some degree of tension, as in refugee and host communities in Malaysia and Syria (Alfarah & Bosco, 2018, as cited in Jordan & Mitchell, 2020; Shekaliu et al., 2018). This underscores the power of even the most simple communication on teachers' emotional health. Research shows that small acts of text-based interactions—checking in and simply saying "hello" via text message—is an important emotional support and contributes to a general sense of wellbeing (Liu et al., 2022).

### Tablets for coaching: *Tangerine:Coach* (Kenya)

While phones are more common tools in terms of mobile professional development for teachers, digital tablets also play a key role in facilitating classroom-focused coaching: Teacher educators can use tablets to record a teacher's lesson and analyze the video together as part of post-feedback observations (McAleavy et al., 2018, p. 38). One of the best-known uses of tablets for coaching is RTI's *Tangerine:Coach* which was developed for Android tablets and optimized for use offline. It is currently deployed in Bangladesh, Cambodia, Georgia, Jordan, Kenya, the Kyrgyz Republic, Liberia, the Philippines, Sierra Leone, Uganda, Uzbekistan, and the West Bank (Palestine) (C. Strigel, personal communication, July 19, 2022).

This tablet-based coaching platform contains customizable, logic-driven forms, and can combine and analyze results from classroom observations to generate coaching feedback reports—all offline. In turn, the reports are used by school-based coaches to guide and inform conversations with teachers. Data from multiple users also can be aggregated through online syncing to a central server database from which Web-accessible data dashboards can be deployed to monitor educational quality (Pouezevara et al., 2019).

As the coach observes a classroom, he or she calls up the particular lesson plan enacted by the teacher. As classroom observation data are entered into *Tangerine:Coach*, the platform generates suggested feedback for the teacher—for example, to adopt a specific pedagogical practice (e.g., predictive questioning for reading instruction). Where there are videos,[14] the coach can share these with teachers to model optimal teaching. *Tangerine:Coach* helps coaches increase the quality of their instructional support to teachers, thus addressing an area of support that has traditionally been an area of weakness, and potentially resulting in more effective instructional support (Piper et al., 2017, p. 67).

Most of the data on the impact of *Tangerine:Coach* originates from its use in Kenya and Sierra Leone. In Kenya, coaches reported increased coaching visits, greater ability to track teacher and student progress, and improved quality of their own feedback to teachers—gains they attributed to the tablet-based platform (Piper et al., 2017, p. 67).

### Coaching while teaching: Virtual Bug in the Ear (Indonesia, United States)

"Virtual bug in the ear" (VBIE) technology is an example of synchronous or live coaching not via

[14] RTI provides the platform, but education systems must supply the content (lesson plans, videos) that work in the platform.

a mobile phone *per se* but via a Bluetooth earpiece. It also involves *Skype* or *Zoom*, a high-definition camera in the teacher's classroom, a coach who watches the class live, and a tablet, phone, or laptop. The coach observes the class via the camera and gives real-time targeted feedback that the teacher hears via his/her Bluetooth earpiece. The information is communicated directly to the teacher's earpiece, so only the teacher hears—students do not. The teacher thus can make immediate real-time improvements in a lesson as suggested by the coach. As long as the teacher's phone is Bluetooth enabled, the coach can communicate live with the teacher via a simple voice call.

The approach, which EDC briefly trialed in Indonesia in 2008 and which is used more extensively across a number of U.S. school districts, has its pros and cons. Teachers get real-time feedback; and by using a video-based call-recording system such as *Pamela*, VBIE sessions can be saved as electronic video files and the teacher and coach can view them together after the class. In Indonesia, female teachers who wore the traditional Muslim head covering, the hijab, were more willing to try out VBIE than were male teachers whose students would notice the earpiece. VBIE also requires strong Internet access and Bluetooth earpieces to avoid audio and communication issues, and coaches must communicate in brief, clear, and direct statements.

Research on VBIE is neither abundant nor rigorous, though the application has been in use since the 1990s. A mixed-methods follow-on study from an original 2009 study confirmed that initial positive improvements in teaching practices withstood the test of time. Though not definitive, the same research found successful longer term use, as evidenced by continued improvements in teacher and student behavior that were apparent 1–3 years later with continued online BIE feedback (Rock et al., 2014).

Coaching is discussed in greater detail in *Chapter 16: Supporting Distance Learners*.

### Supporting behavioral changes with phone-based nudges: Botswana, Niger, Malawi, and Kenya

In their 2008 book *Nudge*, Thaler and Sunstein popularized the notion of "nudges"—reminders or reinforcements that alter people's behavior in positive ways without requiring too much effort on their part. Mobile phones can provide timely nudges, via text and voice calls, to modify adult behaviors in ways that have positive educational effects. For example, low-income parents in the U.S. who received three weekly text messages about their children's academic skills increased their own involvement in their child's learning and saw gains in their children's early literacy by 0.11 SDs (York & Loeb, 2018). In Botswana, children whose parents received an SMS text and live phone calls from a teacher experienced gains in numerical skill, on average, of 24% (0.29 SDs) on the Annual Status of Education Report (ASER). (Angrist et al., 2020).

Nudges may also work with adult learners and teachers. In the previously-mentioned Projet ABC, additional research found that adults in Niger who received weekly phone calls as part of a two-year education program improved their math and literacy test scores (0.19–0.22 Standard Deviations) over those who did not receive weekly phone calls (Aker et al., 2012). Comparable results occurred in Malawi, where RTI used mobile texting to provide teachers with support between face-to-face training sessions. One group of participating teachers received 49 SMS messages (seven messages per week over seven weeks) in addition to face-to-face support, while a matched control group received only face-to-face support. The SMS messages were designed to "remind and reinforce" simple behaviors—for example, encouraging certain student behaviors or pedagogical reminders (Slade et al., 2019, p. 140). Results showed modest but statistically significant gains for the SMS group, with the teachers in that group better able to retain the information presented at trainings (Slade et al., 2019). In Kenya, teachers who received weekly text-messages saw positive effects on classroom practices, with effect sizes from 0.57 to 1.15, as well as a positive effect on three of four primary measures of children's literacy, with effect sizes up to 0.64 (Jukes et al., 2016). Such "nudges" are attractive because they can be implemented using interactive voice response (IVR), which allows for higher volumes of calls and more diverse audio content.

The examples above are promising and seemingly cost-effective. However, it is far from certain that short text- and voice-based nudges can replace the richness and depth of a coaching relationship. Further, the effect sizes for nudges have been highly variable, and though all interventions may be guilty of publication bias, nudge theory is particularly culpable (The Economist, 2022). However, in environments where teachers lack relevant instructional and human supports, nudges may be effective in promoting at least some simple behaviors and may help to overcome the intention-implementation gap. Behavioral research suggests that people are eager to follow social norms but get caught up in daily living and forget to implement desirable behaviors even though they want to (LaMotte, 2021). Thus, nudges via technology with which teachers interact on a regular basis may help change behavior for the better.

## 6.5 Considerations: Mobile Technologies for Distance Education

### 6.5.1 Benefits of Mobile Distance Education

Mobile phones and tablets have myriad benefits as tools for teachers' professional learning.

#### Mobile technologies ensure access to formal learning and content that might otherwise be unavailable

As the examples throughout this chapter have shown, mobile technologies—particularly phones—have provided teachers with access to experiences, content, learning, resources, and people that might otherwise be unavailable. The "killer apps" of cell phones—voice and text—are still the most basic and powerful of learning tools. And mobile phones blend old modalities, such as audio and text, with new ones (e.g., social media and video). This accretive capacity means that mobile phones can provide a variety of learning opportunities, just-in-time resources and assistance, and personalized and individualized support and instruction for teachers in low-resource contexts in ways that online learning does not, and interactive audio cannot (Burns, 2013).

It also means that many of the features and functions available on more complex and expensive computers can increasingly be found on mobile devices. This convergence between mobile and Web-based media and applications essentially makes cell phones an extension of computers (or vice versa). Quick response (QR) code readers enable cell phones and camera-enabled tablets to capture print, multimedia, and Web-based data so that such data can be viewed, published to social media sites, and tracked. Mobile apps are designed so that online courses can be optimally viewed on smaller screens, with limited scrolling, so the interface optimizes the learning experience.

#### Mobile phones are a "bottom of the pyramid" technology

Like radio and television, phones are commonly used, shared, and owned by people in many parts of the globe. Indeed, mobile phone ownership exceeds both computer and tablet ownership across the globe (StatCounter, 2022). Phones can be leveraged for educational purposes—like radio and unlike the Internet— since many low-resource nations have well-developed cellular networks and infrastructure, and many teachers already own and know how to use cell phones.

Mobile phones are far more affordable than laptops for poor countries, even factoring in equipment donations. Indeed, the cost of mobile phone ownership has declined to the point that ownership can be found across all socio-economic groups. Cell phone networks (through which mobile devices can connect to the Internet) are generally cheaper and more widespread than Internet coverage, providing greater access to resources and people in ways the Internet cannot do.[15]

Particularly since COVID-19 pandemic school lockdowns, many governments, as well as telecommunications companies in places such as South Africa and the United States, have worked to reduce the data costs associated with mobile learning via zero rating access to educational content. For example, in South Africa, the Department of Basic Education makes all its educational content available on its "DBE cloud," downloadable for 2 South African cents per day to access. There also are incentive programs, as in Ogun State, Nigeria, where teachers get additional phone minutes when they access educational content from certain sites (Burns et al., 2019). In the United Arab Emirates, during COVID-19 pandemic school closures, the Ministry of Education, along with the Telecommunications Regulatory Authority (TRA) and two Internet providers (Du and Etisalat), collaborated to ensure free mobile Internet access for those who lacked access at home (Ministry of Education United Arab Emirates, 2021).

### Mobile technologies can provide learning and support to some of the hardest-to-reach populations

Across refugee camps, mobile learning is particularly important for refugee and internally displaced teachers, many of whom are forced to move constantly from one location to the next. With mobile devices, learning moves with these teachers (Dahya & Dryden-Peterson, 2017; Miao et al., 2018). In a multiyear study on the relationship between transnational support, ICTs, and higher education in the Dadaab, Kenya, refugee camps, Somali refugee teachers reported that mobile phones, messaging services, and social networks were critical components of their professional success (Dahya & Dryden-Peterson, 2017).

### Mobile technologies can scale learning

"Scale" is a frequently utilized but underdefined concept in education. Coburn (2003) defines scale as consisting of depth, shift, spread, ownership, and sustainability, and as explained here, mobile learning indeed hews to Coburn's framework:

- **Depth.** Teachers know how to use mobile phones for a variety of functions; their use is not compartmentalized, as it is with computers.
- **Ownership.** Teachers own and value phones. Phones are often personal extensions of the human beings who own them, and people often cannot imagine not having one.
- **Shift.** Teachers employ phones for all facets of life—for personal, professional, recreational, educational, and economic purposes—and are thus more willing to adopt new uses of phones for novel endeavors.
- **Spread.** The proliferation of mobile technology projects and mobile support groups for teacher sharing of resources and ideas suggests that phones are viewed as important professional tools and mobile-based projects viewed by teachers as having value.
- **Sustainability.** Distance education projects can leverage the phones teachers already own for support to be provided at low cost to reach a broad audience in the form of nudges, texts, and voice messages.

### Mobile technologies have made teacher professional development more relevant and responsive

Phones and tablets have influenced concepts of how, where, and when professional learning occurs. For places where mobile devices are common, online learning is widely available, and notions of professional learning are more flexible, this

[15] For instance, India enacted telecommunications reform in 1999, and many African nations have opened their telecommunications market to competition, thus depressing costs.

development is mundane. But in parts of the globe where learning is time- and place-bound, where professional knowledge is fixed in a national canon of information, and where information is transferred by a more expert "other," the changes wrought by networked mobile devices have been quietly dramatic. This was most evident during COVID-19 pandemic school closures, when teachers in many countries rejected "official" national, regional, or district online professional development in favor of self-directed learning (via *YouTube* videos), peer-based learning (via *WhatsApp* groups and the SMS features of phones), and formal learning options (via mini-courses), mostly delivered by phones (Burns, in press).

### 6.5.2 Limitations of Mobile Distance Education

As with all technologies, it is prudent to temper hope and enthusiasm when discussing mobile phones for teacher learning by acknowledging some of the weaknesses that accompany mobile professional development.

#### Mobile technologies are not a problem-free solution to teacher training

Like any technology, mobile technologies suffer from a host of technical, financial, curricular, human capacity, quality, and infrastructural issues. Cell towers can fail, phones break, communication is interrupted, and data can be expensive (especially in Sub-Saharan Africa, which has some of the highest data costs in the world).[16] Planned obsolescence is real—operating systems and devices are designed to last only so long. Not every teacher knows how to use his/her phone for learning or wants to. Access to materials and learning does not equate with quality. Phone-based curriculum materials and content may not align with the national curriculum (Tausin & Stannard, 2018). And many pre- and in-service teacher initiatives count on teachers subsidizing technology by using their own phones and paying for their own data plans.

#### The Digital Divide persists in mobile technologies ownership

Despite pervasive levels of phone ownership globally, the digital divide still exists in mobile phone ownership. In some of the world's poorest and most strife-ridden places, such as the Democratic Republic of Congo and the Central African Republic, mobile infrastructure is poor and mobile ownership often is limited to capital cities. Though Africa has been the continent with the highest growth of mobile phone users, Sub-Saharan Africa continues to have the lowest rate of smartphone ownership of any geographic region (World Bank, 2017, as cited in Morris et al., 2021). Indeed, ownership is still concentrated in urban areas and in a handful of countries—Nigeria, Ghana, Kenya, and South Africa (Pew Research Center, 2018). The most common type of mobile device owned by users in Sub-Saharan Africa is still a feature phone, which limits the types of learning in which teachers can engage (Morris & Farrell, 2020).

Even where people have mobile phones and where there is mobile broadband coverage, financial, literacy-related, technical, and policy-related issues have contributed to a significant "usage gap." Over three billion people (41% of the global population) live in areas covered by mobile broadband networks but do not or cannot subscribe to these services (GSMA, 2022, p. 2). Rural populations and women in the Global South are 40% and 23% less likely than urban residents and men, respectively, to use mobile Internet (GSMA, 2020, p. 12). With much of the usage gap being financial in nature low-cost mobile phone providers such as KaiOS, which also offer inexpensive data plans, platforms, and apps, may help to narrow this usage gap (Broadband Commission for Sustainable Development, 2021; KaiOS, 2021).

[16] As an example, the most expensive country in Europe for 1 GB of mobile data is Norway (5.81 USD) and the cheapest is Italy (0.27 USD). The most expensive country in Africa for 1 GB of mobile data is Equatorial Guinea (49.67 USD) and the cheapest is South Sudan (also 0.27 USD). Fifty-two African countries have data costs higher than those of Italy, and eight of those Sub-Saharan countries have higher data costs than Norway (Statista, 2021; Statista, 2022).

### Laptops are still better suited to online learning

When it comes to optimal technology tools for learning, particularly formal online learning, phones still do not quite measure up to computers in terms of productivity, processing, more comprehensive interaction with content, and access to powerful applications. The phone's small screen and keyboard can make interacting with, and processing information difficult, and its operating systems, screen size, and app-based nature limit the kinds of learning activities and features that are so easy to complete on computers. Mobile learners who access their online course via a Wi-Fi connection have slower download speeds. An image that shows up quickly on an Internet-connected laptop will take longer to load on a smartphone—and of course, many feature phones simply will not support online learning. There are other issues: It can be cumbersome to read from a mobile phone (particularly PDFs), more difficult to write, images may not display properly, and many online courses may not be responsively designed, making online learning via a phone difficult and frustrating.

Teachers appreciate mobile phones for their many benefits, such as finding information and quick communication, but they report a preference for laptops over mobile phones for formal learning (Burns, in press). The danger—further elaborated upon below—is that online courses default to exclusively designing online learning for mobile phones, thereby resulting in shorter readings, less information, narrower learning experiences, and the exclusion of certain types of meaningful learning activities and materials that don't work well on a mobile device.

### Mobile phones can result in a reductionist view of teacher professional development

Technology has a dualistic nature—offering opportunities for learning that might otherwise be unimaginable, while at the same time constraining and circumscribing that learning. Thus, the danger is that the technology itself becomes the professional development, rather than fitting technology into the greater corpus of professional development. While phones are valuable vehicles for professional learning for teachers who might otherwise lack access to learning, it is important to guard against a reductionist vision of learning that conflates teacher professional development and support with little more than text messages, *WhatsApp* groups, phone calls, and audio snippets versus sustained face-to-face interaction with colleagues, materials, and experiences (Burns, 2015).The fact that mobile phones can offer support to teachers that is both cheap and scalable represents an opportunity—and also a threat. All things being equal, a lot of phone-based learning is not as ideal as face-to-face or even online learning. It is better than nothing. But "better than nothing" cannot be a defining ethos for teacher professional development, especially for teachers with the greatest needs and the least amount of professional formation. Where other options are available, mobile phones should support, but not replace, more proven forms of professional development and support (Burns, 2013).

### Non-English-speaking users of messaging services are particularly vulnerable to misinformation and disinformation

Misinformation is "false or misleading content shared without harmful intent though the effects can still be harmful, e.g. when people share false information with friends in good faith." Disinformation is "false or misleading content spread with an intention to deceive or secure (some personal) gain and which may cause public harm" (European Commission, 2020).

Both are spread, not simply through social media sites such as *Facebook*, as discussed in the previous chapter, they also are a prominent feature of messaging services like *WhatsApp*. The ubiquity of *WhatsApp*, its encrypted nature, lack of content moderation in languages other than English, and popularity among teachers who value their trusted teacher communities' mean that misinformation and disinformation spread more quickly.

As previous discussions of *WhatsApp*-based professional learning communities in Latin America suggest, *WhatsApp* use is particularly high in Latin America; in the U.S., Latinos get more news from messaging groups than do members of any other ethnic group (Valencia, 2021). Eighty-seven percent of Meta's spending to battle misinformation focuses entirely on English speakers (Meta is the parent company of *WhatsApp*). Thus, an "entire continent of Spanish-language misinformation is largely unchecked by the platform" (Valencia, 2021). Information often cannot be verified, and app users and platform operators have limited means to address and intervene as misleading or harmful content spreads. Thus, a service so treasured—by the education community in general and by teachers in particular—for its ability to share knowledge and offer support within trusted circles of colleagues has commandeered these same trusted networks to promulgate lies and falsehoods.

### The mobile teacher professional development research base is thin

As seen from this chapter, the use of mobile devices for teacher education purposes is a growing field with many positive empirical results (Marques & Pombo, 2021). Yet, despite collective enthusiasm regarding the cost, versatility, scale, ubiquity, utility, and ease of mobile phones, most of the research that exists hews to a few themes: phones as a delivery system (as opposed to a technology with distinct pedagogies), or how teachers can support student learning with mobile technologies (versus how mobile technologies can support formal teacher learning). Thus, claims about the impact of phones must be tempered until there is more robust and definitive research at scale.

## 6.6 Summary of Mobile Distance Education

Figure 6.5 summarizes the role of mobile technologies and their strengths and limitations as a mode of teacher distance education.

**Figure 6.5**
**Summary of Mobile Distance Education**

| Roles in Teacher Professional Development | Strengths | Limitations |
|---|---|---|
| • Mobile devices can provide professional development and ongoing support and communication for teachers.<br>• Audio, video, and multimedia can target teachers' content, instructional, and assessment skills.<br>• Mobile devices offer teachers access to learning resources for use with students.<br>• Mobile devices provide in-class support and consultation for teachers. | • With "anytime, anyplace" learning, teachers can access help and resources from their own classrooms.<br>• The abundance of apps has allowed districts, regional education offices, or universities to offer customizable, differentiated, and personalized learning opportunities to teachers.<br>• Relatively inexpensive phones and phone cards can be purchased and distributed to more teachers (compared to computers).<br>• Mobile technologies require very little training for teachers. | • Mobile devices depend on regular access to electricity, a cellular network, or the Internet.<br>• Multimedia and interactive content still require high mobile broadband.<br>• Their size and portability make mobile devices easy to steal, lose, and damage.<br>• Input/output devices (small screen and small keyboard) make typing and reading a less than optimal experience.<br>• Planned obsolescence: Tablets and smart phones are designed to last only a few years. |

| Roles in Teacher Professional Development | Strengths | Limitations |
|---|---|---|
| • As more software has been developed for mobile phones and tablets, and as online courses have become responsively designed, mobile learning has become a popular professional development option.<br>• Like television and radio, mobile phones have been harnessed to provide professional learning to "hardest-to-reach" teachers.<br>• The Multimedia Messaging Service (MMS) capability of cell phones permits resource sharing (video, audio, images). | • Smart phones function as mini-computers and so can support micro-learning.<br>• In areas with poor Internet connectivity, teachers can access the Internet via cellular networks since cell phone coverage often is more prevalent and reliable than Internet access.<br>• The use of styluses and gesture-based input makes keyboarding a less necessary skill.<br>• Mobile learning technologies capitalize on technologies (phones) that teachers own, with which they are already familiar, and on which they rely for a variety of functions. | • In the case of smart phones, Internet access may be robust in cities with 3G/4G/5G coverage but limited in rural areas that lack these.<br>• Despite improvements in size, design, and functionality, teachers report a preference for online learning via laptops versus mobile learning via phones. |

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## References


Aker, J. S., Ksoll, C., & Lybbert, T. (2012, October). Can mobile phones improve learning? Evidence from a field experiment in Niger. *American Economic Journal: Applied Economics, 4*(4), 94–120. doi:10.1257/app.4.4.94

Aker, J., & Ksoll, C. (2020). Can ABC lead to sustained 123? The medium-term effects of a technology-enhanced adult education program. *Economic Development and Cultural Change, 68*(3), 1081–1102. http://dx.doi.org/10.1086/700558

Angrist, N., Bergman, P., Brewster, C., & Matsheng, M. (2020). *Stemming learning loss during the pandemic: A rapid randomized trial of a low-tech intervention in Botswana, CSAE Working Paper Series 2020-13.* Centre for the Study of African Economies, University of Oxford.

Arnett, T. (2021, August). *Carpe Diem: Convert pandemic struggles into student-centered learning.* Christensen Institute. https://www.christenseninstitute.org/publications/blended-learning-2021/

Bank My Cell. (2022, August). *How many cell phones are in the world?* Bank My Cell. https://www.bankmycell.com/blog/how-many-phones-are-in-the-world

Bradley, L., Bahous, R., & Albasa, A. (2019). Mobile literacy among Syrian refugee women teachers. *CALL and Complexity – Short Papers from EUROCALL 2019*, (pp. 57–62). https://doi.org/10.14705/rpnet.2019.38.986

BRCK Education. (2015). *BRCK Education and Kio Kit Launch.* https://brck.com/brck-education-kio-and-kio-kit-launch/

Broadband Commission for Sustainable Development. (2021, september). *Connecting learning spaces: Possibilities for hybrid learning working group report.* Broadband Commission for Sustainable Development. https://broadbandcommission.org/publication/connecting-learning-spaces/

Bryant, J., Child, F., Dorn, E., & Hall, S. (2022). *New global data reveal education technology's impact on learning.* McKinsey & Company. https://www.mckinsey.com/industries/education/our-insights/new-global-data-reveal-education-technologys-impact-on-learning

Burns, M. (2013, August 20). *If we 'text' it, Will they learn?* Global Partnership for Education | Education for All Blog. https://www.globalpartnership.org/blog/if-we-%E2%80%98text%E2%80%99-it-will-they-learn

Burns, M. (2015, March). Not just for students: Mobile teacher professional development. *Elearn Magazine*. https://elearnmag.acm.org/archive.cfm?aid=2747006

Burns, M. (2021). *Background paper prepared for the 2023 global education monitoring report, Technology and education: Technology in education.* United Nations Educational, Scientific and Cultural Organization. https://unesdoc.unesco.org/ark:/48223/pf0000378951

Burns, M. (in press). *Barriers and supports for technology integration: Views from teachers. background chapter prepared for the global education monitoring report: Technology and education.* United Nations Educational, Scientific and Cultural Organization.

Burns, M., Santally, M., Halkhoree, R., Roopesh Sungkur, K., Juggurnath, B., & Banoor Rajabalee, Y. (2019, November). *ICTs in secondary education in Sub-Saharan Africa: Policies, practices, trends and recommendations.* MasterCard Foundation: Secondary Education in Africa: Preparing Youth for the Future of Work. https://mastercardfdn.org/wp-content/uploads/2019/11/ICT-in-Secondary-Education.pdf

Cobo, C., Hawkins, R., & Rovner, H. (2020, March 31). *How countries across Latin America use technology during COVID-19-driven school closures.* World Bank Blogs. https://blogs.worldbank.org/education/how-countries-across-latin-america-use-technology-during-covid19-driven-school-closures

Coburn, C. (2003). Rethinking scale: Moving beyond numbers to deep and lasting change. *Educational Researcher, 32*(6), 3–12. https://doi.org/10.3102/0013189X032006003

Dahya, N., & Dryden-Peterson, S. (2017). Tracing pathways to higher education for refugees: the role of virtual support networks and mobile phones for women in refugee camps. *Comparative Education*, *53*(2), 284–301.

Ekanayake, T., & Wishart, J. (2014). Developing teachers' pedagogical practice in teaching science lessons with mobile phones. *Technology, Pedagogy & Education*, *23*(2), 131–150. https://doi.org/10.1080/1475939X.2013.810366

English in Action. (2018). *English in action: Introduction*. https://www.eiabd.com/about-eia/eia-introduction.html

European Commission. (2020, March 12). *European democracy action plan*. Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX%3A52020DC0790

GSMA. (2014, February). *Text2Teach.* GSMA mEducation. https://www.gsma.com/iot/wp-content/uploads/2014/03/Text2Teach-case-study-final.pdf

GSMA. (2020). *Connected women: Mobile gender gap report: 2020.* https://www.gsma.com/mobilefordevelopment/wp-content/uploads/2020/05/GSMA-The-Mobile-Gender-Gap-Report-2020.pdf

GSMA. (2022). *The mobile ecomomy 2022.* GSMA.com. https://www.gsma.com/mobileeconomy/wp-content/uploads/2022/02/280222-The-Mobile-Economy-2022.pdf

Hirsh-Pasek, K., Zosh, J., Golinkoff, R., Gray, J., Robb, M., & Kaufman, J. (2015). Putting education in "educational" apps: Lessons from the science of learning. *Psychological Science in the Public Interest, 16*(1), 3–34. https://doi.org/10.1177/1529100615569721

Jiang, X., Chen, H., Portnoff, L., Gustafson, E., Rollinson, J., Plonsky, L., & Pajak, B. (2021). *Seven units of Duolingo courses comparable to 5 university semesters in reading and listening: Duolingo Research Report DRR-21-03 November 11, 2021.* Duolingo. https://www.duolingo.com/efficacy

Jordan, K., & Mitchell, J. (2020). *Messaging apps, SMS & social media: Rapid evidence review.* doi:10.5281/zenodo.4058181

Jukes, M., Turner, E., Dubek, M., Halliday, K., Inyega, H., Wolf, S., . . . Booker, S. (2016). Improving literacy instruction in Kenya through teacher professional development and text messages support: A cluster randomized trial. *Journal of Research on Educational Effectiveness*. doi:10.1080/19345747.2016.1221487

KaiOS. (2021). *Our mission: Advance digital inclusion and close the digital divide*. KaiOS. https://www.kaiostech.com/company/

Karch, M. (2021, June 19). *A beginner's guide to mobile apps*. Lifewire. https://www.lifewire.com/what-are-apps-1616114

LaMotte, S. (2021, October 12). Get people to do what you want with a 'nudge.' Here's how. *CNN*. https://www.cnn.com/2021/10/12/health/nudge-healthy-behavior-wellness/index.html

Liu, P., Rim, S., Min, L., & Min, K. (2022). The surprise of reaching out: Appreciated more than we think. *Journal of Personality and Social Psychology*. https://doi.org/10.1037/pspi0000402

Marques, M., & Pombo, L. (2021). Teachers' experiences and perceptions regarding mobile augmented reality games: A case study of a teacher training. In L. Chova, A. Martínez, & I. Torres (Eds.), *International technology, education and development (INTED) conference proceedings.*

McAleavy, T., Hall-Chen, A., Horrocks, S., & Riggall, A. (2018). *Technology-supported professional development for teachers: Lessons from developing countries.* Education Development Trust. https://www.educationdevelopmenttrust.com/EducationDevelopmentTrust/files/34/3463d85a-031c-4f1e-9002-969b4daf4cdf.pdf

McCormick, C. (2018). *Online learning: Investigating the impact of asynchronous and synchronous communication, on the students of color* [Doctoral dissertation, Wingate University]. https://www.waketech.edu/sites/default/files/page-file-uploads/Online_Learning_Investigating.pdf

Mendenhall, M., Bowden, L., Cha, J., Collas, S., Falk, D., French, S., . . . Skinner, M. (2017). *Strengthening teacher professional development: Local and global communities of practice in Kakuma Refugee Camp, Kenya.* https://www.eccnetwork.net/resources/strengthening-teacher-professional-development

Menon, D. (2022). Uses and gratifications of educational apps: A study during COVID-19 pandemic. *Computers and Education Open, 3*. https://doi.org/10.1016/j.caeo.2022.100076

Meyer, M., Zosh, J., McLaren, C., Robb, M., McCafferty, H., Michnick , R., . . . Radesky, J. (2021). How educational are "educational" apps for young children? App store content analysis using the four pillars of learning framework. *Journal of Children and Media*. doi:10.1080/17482798.2021.1882516

Miao, F., Pagano, M., Atchoarena, D., Pimmer, C., Gröhbiel, U., Zelezny-Green, R., & Strecker, J. (2018). *A lifeline to learning. Leveraging technology to support education for refugees.* UNESDOC Digital Library: https://unesdoc.unesco.org/ark:/48223/pf0000261278_eng

Ministry of Education United Arab Emirates. (2021, August 23). *Distance learning in times of COVID-19*. Ministry of Education United Arab Emirates. https://u.ae/en/information-and-services/education/distance-learning-in-times-of-covid-19

Morris, E., & Farrell, A. (2020). *Delivering distance learning in emergencies: A literature review.* United States Agency for International Development. https://www.edu-links.org/resources/delivering-distance-learning-emergencies

Morris, E., Farrell, A., & Venetis, E. (2021, January). *A roadmap for for measuring distance learning: A review of evidence and emerging practices.* United States Agency for International Development. https://www.edu-links.org/sites/default/files/media/file/Measuring%20Impact%20and%20Outcomes_Final_01.20.2021-508%20%281%29.pdf

Nyamai, F. (2020, August 21). Kenya: School tablets project gobbles up Sh32 Billion. *allAfrica*. https://allafrica.com/stories/202008210175.html

OneBillion. (2022). *OneBillion*. https://onebillion.org/onetab/

Outhwaite, L., Faulder, M., Gulliford, A., & Pitchford, N. (2019). Raising early achievement in math with interactive apps: A randomized control trial. *Journal of Educational Psychology, 111*, 284–298. https://doi.org/10.1037/edu0000286

Pew Research Center. (2018). *Internet connectivity seen as having positive impact on life in Sub-Saharan Africa.* https://www.pewresearch.org/global/2018/10/09/majorities-in-sub-saharan-africa-own-mobile-phones-but-smartphone-adoption-is-modest/

Piper, B., Oyanga, A., Mejia, J., & Pouezevara, S. (2017). Implementing large-scale instructional technology in Kenya: Changing instructional practice and developing accountability in a national education system. *International Journal of Education and Development Using Information and Communication Technology, 13*(3), 57–79. https://www.learntechlib.org/p/182157/

Pitchford, N., Chigeda, A., & Hubber, P. (2019, May). Interactive apps prevent gender discrepancies in early-grade mathematics in a low-income country in sub-Sahara Africa. *Development Science, 22:e12864*, 1–14. doi:10.1111/desc.12864

Pouezevara, S., Brunette, T., Jordan, R., & Nakyejwe, D. (2019). *Google.org Grant Uganda impact study report.* Research Triangle, N.C.: RTI International.

Richmond, S., & Vinagradova, E. (2017). *Vernacular evaluation: A cost-effectiveness study of ICT in the community school classroom. Evaluation prepared for USAID.* Education Development Center.

Rivera, O., Amador, A., Ruiz-Gaona, L., & Gómez Treviño, D. (2022, June). *Implementation challenges of an impact assessment: The ATEMA project in Puerto Rico.* Abdul Latif Jameel Poverty Action Lab. https://www.povertyactionlab.org/blog/6-29-22/implementation-challenges-impact-assessment-atema-project-puerto-rico?lang=en

Robles, D. (2018). Text2teach educational media: Implementer's feedback and learner's academic performance. *International Journal of Physics & Mathematics, 1*(1), 8-20. https://doi.org/10.31295/ijpm.v1n1.39

Rock, M., Schumacker, R., Gregg, M., Howard, P., Gable, R., & Zigmond, N. (2014). How Are They Now? Longer Term effects of ecoaching through online Bug-In-Ear technology. *Teacher Education and Special Education, 37*(2), 161–181. doi:10.1177/0888406414525048

Sauvakacolo, S. (2022, May 22). Schools encouraged to purchase tablets. *The Fiji Times*. https://www.fijitimes.com/schools-encouraged-to-purchase-tablets/

Shekaliu, S., Mustafa, S., Adnan, H., & Guajardo, J. (2018). The use and effectiveness of Facebook in small-scale volunteer organisation for refugee children's education in Malaysia. *The Journal of the South East Asia Research Centre for Communication and Humanities, 10*(1), 53–78. https://www.researchgate.net/profile/Ezaleila-Mustafa/publication/324280704_The_Use_and_Effectiveness_of_Facebook_in_Small-Scale_Volunteer_Organisation_for_Refugee_Children's_Education_in_Malaysia/links/

Slade, T., Kipp, S., Cummings, S., & Nyirongo, K. (2019). Short message service (SMS)-based remote support and teacher retention of training gains in Malawi. In S. Pouezevara (Ed.), *Cultivating dynamic educators: Case studies in teacher behavior change in Africa and Asia* (pp. 131–167). RTI International. https://ierc-publicfiles.s3.amazonaws.com/public/resources/Malawi%20Chapter%205%20-%20SMS%20teacher%20support.pdf

StatCounter. (2022). *Desktop vs mobile vs tablet market share worldwide*. StatCounter.com. https://gs.statcounter.com/platform-market-share/desktop-mobile-tablet

Statista. (2021, July 12). *Average price of mobile data in selected Western European nations 2019-2021.* Statista. https://www.statista.com/statistics/1123435/price-mobile-data-europe/

Statista. (2022, September). *Number of internet and social media users worldwide as of July 2022*. Statista. https://www.statista.com/statistics/617136/digital-population-worldwide/

Tausin, M., & Stannard, L. (2018). *EdTech for learning in emergencies and displaced settings: A rigorous review and narrative synthesis.* Save the Children. https://resourcentre.savethechildren.net/library/edtech-learning-emergencies-and-displaced-settings-rigorous-review-and-narrative-synthesis

Thaler, R., & Sunstein, C. (2008). *Nudge: Improving decisions about health, wealth, and happiness.* Yale University Press.

The Economist. (2022, July 27). Evidence for behavioural interventions looks increasingly shaky. *The Economist*. https://www.economist.com/science-and-technology/2022/07/27/evidence-for-behavioural-interventions-looks-increasingly-shaky

The World Bank Group. (2021). *Online learning models - How to include youth in low bandwidth areas.* Solutions for Youth Employment. https://www.s4ye.org/sites/default/files/2021-04/S4YE%20Brief%20Online%20Learning%20Models%20for%20Low%20Bandwidth%20Areas%20.pdf

Trucano, M. (2015, July 28). *Tablets in education.* World Bank Blogs. https://blogs.worldbank.org/edutech/tablets-education

United Nations Children's Fund Latin America and the Caribbean Section. (2020). *Latin America & the Caribbean COVID-19 education response: COVID-19 Impact on education in the Latin America & the Caribbean Region (LAC).* https://www.unicef.org/lac/en/media/14241/file

United Nations Educational, Scientific and Cultural Organization. (2015, September 16). *Alphabétisation de base par cellulaire (ABC): Mobiles 4 literacy (Niger).* UNESCO Institute for Lifelong Learning. https://uil.unesco.org/case-study/effective-practices-database-litbase-0/alphabetisation-base-cellulaire-abc-mobiles-4

United Nations Educational, Scientific and Cultural Organization and Deutsche Gesellschaft für Internationale Zusammenarbeit. (2022). *The future teacher kit: A low-tech, high-impact solution for collaborative teacher training.* UNESCO and GIZ.

United Nations Educational, Scientific and Cultural Organization Insititute for Lifelong Learning, & Commonwealth of Learning. (2021). *Guidelines on open and distance learning for youth and adult literacy.*

Valencia, S. (2021, October 28). Misinformation online is bad in English. But it's far worse in Spanish. *The Washington Post*. https://www.washingtonpost.com/outlook/2021/10/28/misinformation-spanish-facebook-social-media/

Van Nostrand, P., Noakes, S., Shah, Z., & Luna, L. (2022, February). *An overlooked indicator of edtech quality: The use of learning sciences research.* Digital Promise. https://doi.org/10.51388/20.500.12265/150

Vodafone Foundation. (2021). *Instant schools network*. https://www.vodafone.com/vodafone-foundation/focus-areas/instant-network-schools

World Bank and International Telecommunication Union. (2022). *Individuals using the Internet (% of population) - Sub-Saharan Africa*. World Bank. https://data.worldbank.org/indicator/IT.NET.USER.ZS?locations=ZG

York, B. N., & Loeb, S. (2018). *One step at a time: The effects of an early literacy text messaging program for parents of preschoolers, Working paper 20659.* National Bureau of Educational Research. https://www.nber.org/papers/w20659

Section I. Chapter 7

# SUMMARY—MODES AND MODELS OF DISTANCE EDUCATION

## Distance learning has evolved from the model of the solo learner, like Margaret in the Foreword of this guide, to a community of learners engaged in a common pursuit.

Section I of this distance education guide has focused on *modes* of distance education for teachers and on *models*—the paths, intentions, contexts, and conditions under which these distance education modes are enacted. In so doing, Section I also has discussed many of the shifts in and convergences among *audiences* (teachers, students, teachers, *and* students) and content *formats* (audio, multimedia, visual) and the benefits and challenges of each mode of distance education for teacher education.

Several themes regarding distance technologies emerge from and undergird the previous chapters.

**Technology underperforms in the short run and overperforms in the long run.** Despite the excitement associated with newer technologies, there is often little research demonstrating their effectiveness. The teaching and learning benefits of technology take time to accrue as users, designers, managers, and instructors learn how best to fit technology with distinct types of instruction and researchers accumulate an evidence base. This process is neither linear nor rapid and often requires much trial, error, revision, and redesign. Not surprisingly then, some of the most successful and high-performing technology tools are older technologies, such as interactive audio instruction, Computer Aided Instruction, and instructional television.

**There is a strong evidence base in many types of distance technologies.** In continuation of the above point, the research and evaluation base on distance technologies has expanded significantly in the past decade. This is in part due to a growing recognition within the education community about the need to determine and ensure quality and for greater scrutiny around the rapid adoption of distance technologies with their "often-high costs and claims about potential impact" (Escueta et al., 2020, p. 899; Pouezevara et al., 2019).

The research base around more established and incumbent technologies, such as Computer Aided Instruction or certain forms of online learning is increasingly robust. Newer technologies, too, especially those situated at universities, such as MOOCs, mixed reality, and simulation software, have also benefitted from a growing evidence base. That said, this research expansion is not universal (e.g., mobile technologies still are relatively undertheorized); much of the research is observational (as in the case of online learning); much of the research ignores technology for teacher learning (particularly in the case of multimedia); there is often major publication bias (publishing what works versus what doesn't); and not every intervention can be evaluated. But the expansion of research is promising, and we should anticipate more such evidence as researchers and practitioners reflect on distance learning during and following COVID-19 pandemic school lockdowns.

**There is great untapped potential for teacher professional learning.** Many of the technologies discussed in the previous chapters are designed primarily for *student* learning, with far fewer for *teacher* learning. Yet they may also hold multiple untapped benefits for augmenting teachers' knowledge, skills, and attitudes. Distance education designers can incorporate teacher needs into distance offerings thus ensuring that the use of these technologies simultaneously enhances teacher skills as it educates students. For instance, simulation and mixed reality programs could bolster teachers' instructional and classroom management skills before they arrive at their pre-service practicum or very first teaching assignment. Interactive television programming could incorporate deliberately designed activities directed at teachers to improve their content and pedagogical content skills as it helps students master content.

Rapid technological changes in modes of distance education delivery are redefining distance education. Writing about technology—and by extension distance education—is difficult, for it is in a constant state of change. These changes are erasing concepts such as "distance," redefining notions of "learning" and "education," and compelling learners and their instructors to interact, learn, and work in previously unimaginable ways (Santally, 2016). Learning, even at a distance, means that institutions, administrators of distance education programs, distance instructors, and distance learners (both pre-service and in-service teachers) must reexamine how and where learning occurs, their roles and daily tasks within an ever-shifting technological and learning environment, and, by extension, how teaching and learning occur in the classrooms they manage.

Distance education has shifted from input- to outcome-based professional development. Traditional distance education, particularly print and broadcast media, often focused more on seat time (hours), knowledge transmission, minimal interaction between learners, and declarative knowledge gains measured by traditional assessment. This has changed dramatically as distance education is increasingly geared toward more learner-centered outcome-based experiences focused on teachers' competencies, dynamic knowledge creation and sharing, and flexible assessments. The role of distance instructors has changed too as instructors increasingly operate as guides versus sole purveyors of information.

Distance education continues to shift from a static to a dynamic model that accommodates new educational and vocational contingencies and learner needs. As seen in the previous chapters, distance learning has been rapidly transformed as a result of the evolution, proliferation, and convergence of networked and wireless technologies and platforms, and the new types of interactions that such progression make possible. This confluence has brought new awareness of how learning experiences, instruction, and support must be structured within a distance learning model; how instructors and learners act and interact within a distance learning environment; and how technology can or should be used to support such shifts.

The most successful distance education models have moved from the model of the solo learner to one based on learners as part of a community. Distance learning has evolved from the model of the solo learner, like Margaret in the Foreword of this guide, to a community of learners engaged in a common pursuit. Learners are most enthusiastic about technologies that connect them with a community of peers. This focus on the need for community and community formation has become a hallmark of an increasing number of distance education experiences and will be explored in greater detail in the following section of this guide.

Technologies for teacher education are becoming increasingly fungible. Bates (2021) asserts that more than one mode of distance learning can produce roughly equivalent experiences, given sufficient imagination, time, and resources. Almost all distance technologies can scale professional development opportunities to teachers to allow more teachers to participate in high-quality professional learning. More importantly, distance technologies can complement one another and expand the learning universe for teachers. Thus, when used together, as is increasingly the case, distance technologies can differentiate professional development offerings according to teacher needs; connect teachers to colleagues they know and those they don't; provide distance-based support and coaching; and offer ongoing and on-demand professional learning at a time, place, and pace that is convenient to teachers, provided they have a cellular or Internet connection (Burns, 2021).

**Robust design can mitigate teaching variability.** In environments where many teachers lack sufficient content knowledge and pedagogical ability, highly structured digital and analog tools can mitigate inferior quality instruction. Scripted lessons, instructional television, interactive audio instruction, Computer Aided Instruction, virtual classes, radio lessons, and educational apps all have proved to be effective and engaging vehicles for standardize quality instruction and ensuring students' educational attainment in foundational skills (Fabregas, 2019; Pitchford et al., 2019).

**Distance education should be part of a formal education system.** The lessons of the COVID-19 pandemic school closures argue for a well-developed distance education system that is integrated, not peripheral to or parallel with, the overall education system. Developing and integrating distance learning into existing educational systems has implications for instruction, instructional design, content, support systems, the preparation of distance instructors and learners, and changes to the curriculum, content, assessment, infrastructure, teacher professional development, and how programs evaluate their effectiveness and assure quality.

Distance education can no longer be a "nice-to-have" educational system on the periphery of the formal education system. Rather, as the COVID-19 pandemic school lockdowns and emergency remote learning highlighted, distance learning is a "must have." It must be viewed as an essential education pathway, and planned, integrated, and resourced accordingly so it is part of the overall teaching and learning system in a country, region, or province.

**Distance technologies are one piece of the distance education ecosystem.** While the technologies used to support teaching and learning are important for a well-functioning distance education program, more critical for teacher learning are the *type* and *quality* of instruction offered with and through these technologies, the quality of content, the design of learning and how that learning is assessed, and rigorous evaluation and quality assurance mechanisms that guarantee relevance, quality, and utility. Distance technologies will not compensate for poorly designed and taught distance courses, rather they will metastasize them, spreading educational mediocrity through the system. As the next section will emphasize, as they do in in-person learning, good design and instruction matter as much, perhaps even more so, in distance learning.

The above points summarize the preceding chapters of Section I of this guide. They also frame the remaining chapters of this guide, as Section II focuses on "best" or optimal teaching and learning methods across all modes and models of distance education.

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## References

Bates, T. (2021). *12 golden principles for effectively using learning technologies: Still relevant?* Tony Bates.com. https://www.tonybates.ca/2021/11/12/12-guiding-principles-for-teaching-with-technology-still-relevant/

Burns, M. (2021, April 12). Can virtual coaching be an effective substitute for in-person coaching? *Global Partnership for Education | Education for All Blog*. https://www.globalpartnership.org/blog/can-virtual-coaching-be-effective-substitute-person-coaching

Escueta, M., Nickow, A., Oreopoulos, P., & Quan, V. (2020). Upgrading education with technology: Insights from experimental research. *Journal of Economic Literature, 58*(4), 897–996. doi:10.1257/jel.20191507

Fabregas, R. (2019). *Broadcasting education: The long-term effects of México's telesecundarias* [Working paper]. Harvard University. https://scholar.harvard.edu/rfabregas/publications/broadcasting-human-capital-long-term-effects-mexicos-telesecundarias

Pitchford, N., Chigeda, A., & Hubber, P. (2019, May). Interactive apps prevent gender discrepancies in early-grade mathematics in a low-income country in sub-Sahara Africa. *Development Science, 22:e12864*, 1–14. doi:10.1111/desc.12864

Pouezevara, S., Brunette, T., Jordan, R., & Nakyejwe, D. (2019). *Google.org Grant Uganda Impact study report.* RTI International.

Santally, M. (2016). An evaluation of the African leadership in ICT programme from a quality assurance perspective. *European Journal of Open, Distance and E-learning, 19*(2), 114–128. https://files.eric.ed.gov/fulltext/EJ1138166.pdf

Section II.

# METHODS:
# WHAT LEADS TO SUCCESSFUL TEACHING AND LEARNING IN A DISTANCE ENVIRONMENT?

Section II. Chapter 8

# DEVELOPING "GOOD" TEACHERS

## Table of Contents

**Best Practice:** To be worth their investment, distance education programs related to teacher education must have as their core mission the development of "good" teachers and "good" teaching.

## 8.1 Overview

"Good teachers matter."

This declaration, "good teachers matter," is uttered so frequently that it risks becoming a cliché.

Yet high-quality teachers are the single most important educational factor in a child's education (Reid & Kleinhenz, 2015, p. 8). Decades of rigorous research have consistently shown that the difference between having a good teacher and a bad teacher can exceed one grade level in annual achievement growth and accounts for almost a quarter of the variation in student test scores (Hanushek, 1992, 2011; Rockoff, 2004).

Good teachers matter in the Global North. In research conducted in the United States, Chetty et al. (2014) estimate that a one-standard deviation increase in teacher quality in a single grade improves a student's future earnings by 1% per year by the age of 28. Students assigned to these teachers also are more likely to attend college and save for retirement and less likely to have children while teenagers.

Good teachers matter for poor students in these wealthy countries. Lower-achieving students are the most likely to benefit from increases in teacher effectiveness. In 2010, the *Los Angeles Times* conducted a groundbreaking investigation into why many poor Latino students performed well academically in Los Angeles public schools while many others failed. The investigation concluded that the difference between success and failure was not a function of income, intelligence, family, or any other factor. It had to do with the quality of the child's teacher (Felch et al., 2010). These quality effects are cumulative over time and long lasting. Even in their late 20s, "the significant trace of their early schooling is quite discernible" for students whose teachers were rated as "good" in their evaluations (Hanushek, 2012).

But good teachers *really* matter for students in the Global South. As readers well know, students in poor countries tend to have poorly qualified teachers, and as discussed in Chapters 2 and 3, rural students within the Global South are particularly susceptible to poor teacher quality (Akiba et al., 2007). In a cross-sectional study of 46 countries, researchers estimated that in 13 Sub-Saharan African countries, a higher precentage of students in rural areas were more likely than urban students to be taught by teachers with limited experience and poor grades in content area coursework. Not surprisingly, the students of these teachers performed worse in tests of mathematics ability (Akiba et al., 2007).

Going from a low-performing teacher to a high-performing teacher increases learning dramatically for students in the Global South. This effect has been measured from more than 0.2 standard deviations in Ecuador to more than 0.9 standard deviations in India—the equivalent of multiple years of schooling. These effective teachers also have a substantial impact on the long-term well-being of students, affecting not only their academic achievement but their educational attainment and income as well (Beteille & Evans, 2021, p. 4).

## 8.2 What Makes a Good Teacher?

Coming to consensus on the qualities that make a good teacher is imperative for distance programs—and the research largely agrees on the qualities that constitute a good teacher. While there may be more qualities than those listed here (e.g., teaching experience, classroom management skills), and the process of developing good teachers is not as straightforward as simply blending these ingredients together, the following five attributes of "good" teachers continually recur throughout the research (Darling-Hammond & Bransford, 2005; Organisation for Economic Co-operation and Development (OECD), 2009). Each is discussed below.

1. **Content knowledge.** Good teachers have strong knowledge of their subject matter. Measures of teacher preparation and certification are by far the strongest correlates of student achievement in reading and mathematics. Student achievement is significantly related to whether teachers hold subject-specific certification in the field in which they teach (Akbari, 2007; Bold et al., 2017). Research demonstrates that the amount of university-level coursework teachers have taken in their content areas is positively related to student achievement gains (Darling-Hammond, 2000). Teachers' courses in content area and scores on subject-matter tests correlate strongly with student achievement, although the former (content area courses) shows more frequent positive effects than the latter (test scores) (Darling-Hammond & Bransford, 2005; Hanushek & Rivkin, 2010; OECD, 2009).
2. **Structured instructional approach.** Good teachers adopt a structured, planned approach to instruction. This can be a traditional, more direct, "teacher-centered" approach, such as the use of whole-group teaching and direct teaching models. Or it can be student-child or learner-centered, or an "active learning" approach employing more cognitive and social models of teaching and learning (see Figure 8.1). Chapter 10 discusses both of these approaches in greater detail.

**Figure 8.1**
**Models of Teaching and Learning**

Research and practice suggest that learner attainment can be enhanced by the consistent use of specific teaching and learning models. Teachers have always employed an array of instructional models in their repertoire. Three of the more common ones are noted here. While some teachers may rely on one model, many employ all three at various points in a learning unit or across multiple lessons.

1. **Direct teaching models** are often used to help learners master skills and procedures and acquire academic knowledge. Examples include lecture, demonstration, modeling, and whole group instruction.
2. **Cognitive teaching and learning models** are often employed to help learners process information, build concepts, generate, and test hypotheses, and think creatively. Examples include inquiry, inductive learning, metacognitive strategies, and teaching through analogy.
3. **Social models of teaching and learning** require learners to collaborate and co-construct new knowledge and concepts. These models include learner-centered instructional strategies, such as reciprocal instruction, project-based learning, and group problem solving.

In terms of which approach is *better* for student achievement, both traditional and learner-centered approaches have been shown to contribute almost equally as well to student learning (Bernard et al., 2019; Stockard et al., 2018). In terms of which to use, research suggests the efficacy of engaging students in a comprehensive educational approach in which different teaching styles be adopted as the teaching context—the phase of presentation of the subject matter or the types of students—requires (Bernard et al., 2019).

The research does point to additional advantages of learner-centered instruction. In many cases students are better able to acquire complex thinking skills when their teachers help them understand the underlying concepts and patterns that tie together the ideas they are studying; provide models for how to approach learning tasks and reason through problems; allow for hands-on learning; provide scaffolds or structured steps that support the learning process; coach students as they apply their knowledge to real-world tasks; and help students learn to evaluate and regulate their own learning (OECD, 2009).

**Figure 8.2**
**Examples of National Teacher Standards**

Every country has its own conception of what constitutes "good teaching," typically codified in its national teaching standards. Standards set clear and measurable goals for performance and instantiate a country's vision for what good teaching should be and do. Several somewhat geographically diverse examples of national teacher standards are listed here for purposes of exploration. Distance education programs may wish to familiarize themselves with the national teaching standards of the countries in which they operate and design courses that are aligned with such standards.

1. **Australia:** Professional Standards for Teachers
2. **Ghana:** National Teacher Standards
3. **International:** Education International and UNESCO's Global Framework of Professional Teaching Standards
4. **Nigeria:** Professional Teaching Standards for Nigerian Teachers
5. **Singapore:** A Teacher Education Model for the 21st Century (This is a framework.)
6. **United Kingdom:** Teachers' Standards: Guidance for School Leaders, School Staff and Governing Bodies
7. **United States:** Interstate Teacher Assessment and Support Consortium (InTASC)

The importance of standards in every facet of distance instruction will be a through line in the remainder of this guide.

3. **Pedagogical content knowledge.** Teachers' preparation in content and pedagogy is associated with their teaching practices, which in turn influence student achievement. Good teachers have strong pedagogical content knowledge—that is, they know their content and specific strategies for teaching it. Some of the key elements of pedagogical content knowledge are listed below.
   - Knowing how to select topics, useful forms of presentation, analogies, illustrations, examples, explanations, and demonstrations
   - Understanding what makes learning specific topics easy or hard for students (including knowledge about the conceptions and misconceptions students bring to the subject)
   - Acquiring deep knowledge about content and structure of the subject matter
   - Being aware of the appropriate teaching materials, technology, and media, and have strategic knowledge in the application of teaching strategies
   - Teaching specific topics or skills by making clear the context in the broader fundamental structure of a field of knowledge (Shulman, 1986)
4. **Knowledge of how students learn.** Teachers with a good understanding of child and adolescent development and learning are more likely to be effective in the classroom. Teachers who have completed coursework in learning and development are more likely to stay in teaching, and teachers who understand how learning occurs are better able to select and develop a curriculum that supports, rather than undermines, the learning process (Darling-Hammond & Bransford, 2005).

   Research on successful teacher education programs in the United States has found that many of them have particularly strong coursework in child and adolescent development that is tightly linked to clinical observation and analysis of learning—both in school and out of school (Darling-Hammond & Bransford, 2005).
5. **Efficacy.** Many studies have found a positive relationship between teachers' beliefs about their own efficacy and student achievement in core academic outcomes (OECD, 2009; 2019, 2019b).

Efficacy is a broad term that deals with attitudes, beliefs, and perceptions, and it underlies the importance of motivation in teachers' work.

Teachers with strong *self-efficacy* believe that they can be successful; teachers with strong *efficacy* beliefs are confident in their *students'* ability to be successful (Bandura, 1997). They are better able to motivate students because they set exacting standards and believe that they can teach their students what they need to know to attain these standards. They persist until students achieve mastery over the subject at hand (Schleicher, 2020). Teachers with strong efficacy beliefs also demonstrate caring and respectful behaviors toward students and provide a safe learning environment. An added benefit is that teacher efficacy appears to generate a virtuous circle. It is strongly connected to teacher collaboration and participation in professional learning opportunities. This in turn can improve teachers' content knowledge and help teachers cultivate new skills, thus raising their personal competence and efficacy levels (OECD, 2020, p. 19).

### 8.2.1 From Good to Great

Good teaching is both science, as outlined above, and art—a blend of intangible, ineffable skills that move a teacher from a cultivator of knowledge and skills to a more transformative role as guide, mentor, and inspiration. It is the *art* of teaching that in large part moves teachers from good to great—and undergirding all of this is care and passion. Great teachers and great teaching involve holding students to high standards, having empathy, caring deeply about students as learners and as human beings, and communicating this care to students (Dobbie & Fryer, Jr., 2013; Noddings, 2012). Great teachers are passionate about the content they teach. They are passionate about teaching and learning. Above all, they are passionate about their students (Burns, in press).

Placing good teachers in the classroom is only half the battle. The other half is making sure that they teach well. Good teaching is often situationally and contextually defined (Bartanen et al., 2022).

To teach well, teachers need time to plan and to work with students. They need materials and resources with which to instruct children. They need reasonable class sizes and leadership that both understands effective instructional practices and empowers teachers to enact such practices. They need a curriculum and assessment system that facilitates rather than thwarts students' true academic potential. And they need ongoing learning and professional development in current best or innovative practices throughout their entire teaching careers. Without such supports, even the best teachers are likely to languish.

## 8.3 Conclusion

Within education, we often are quite good at identifying and analyzing the problems associated with poor instruction. We are much less adept, however, at identifying the factors that contribute to good teaching and to implementing systems to develop the skills necessary to be good teachers. Therefore, we need to understand the dispositions and behaviors that constitute good teaching so that we design and enact within distance-education programs the practices that cultivate the attributes that contribute to good teaching.

As discussed in this chapter, good teaching involves an interplay of complex behaviors, dispositions, and values. Teachers must know their content and be fluent in numerous instructional approaches. They must know how to cultivate content mastery in their students through a variety of activities and experiences. They must understand how children and adolescents learn and have a value system rooted in the belief that all children and adolescents can learn. They must be educators, counselors, parents, social workers, disciplinarians, and mentors to hundreds of children who enter classrooms with different personalities, learning needs, socioeconomic backgrounds, levels of wellbeing, family situations, tribal affiliations, religions, castes, classes, abilities/disabilities, and life experiences.

Creating an effective distance education system—or indeed any system—for teacher pre-service and in-service training means inculcating and cultivating this set of knowledge, skills, and beliefs in those who are, and those who wish to be, teachers. It also means immersing pre-service teachers and in-service teachers in high-quality distance learning experiences with instructors who themselves embody the characteristics of good teaching. The following chapters discuss the practices that best support the development of good teachers, particularly as they pertain to distance learning environments.

Citation: Burns, M. (2023). Developing "Good" Teachers. In *Distance Education for Teacher Training: Modes, Models and Methods.* (2nd Edition). Washington, DC: Education Development Center.

## References

Akiba, M., LeTendre, G., & Scribner, J. (2007). Teacher quality, opportunity gap, and national achievement in 46 countries. *Educational Researcher, 36*(7), 369-387. https://doi.org/10.3102/0013189X07308739

Bandura, A. (1997). *Self-efficacy: The exercise of control.* W.H. Freeman Publishing.

Bartanen, B., Husain, A., & Liebowitz, D. (2022). *Rethinking principal effects on student outcomes, EdWorking paper 22-621.* Annenberg Institute at Brown University. https://edworkingpapers.com/sites/default/files/ai22-621.pdf

Bernard, R. M., Borokhovski, E., Schmid, R., Waddington, D. I., & Pickup, D. I. (2019). Twenty-first century adaptive teaching and individualized learning operationalized as specific blends of student-centered instructional events: A systematic review and meta-analysis. *Campbell Systematic Review*. doi:10.1002/cl2.1017

Beteille, T., & Evans, D. (2021). *Successful teachers, successful students: Recruiting and supporting society's most crucial profession.* World Bank. https://policycommons.net/artifacts/2445925/successful-teachers-successful-students/3467666/

Bold, T., Filmer, D., Martin, G., Molina, E., Rockmore, C., Stacy, B., . . . Wane, W. (2017). *What do teachers know and do? Does it matter? Evidence from primary schools in Africa. Background paper to the 2018 World development report.* World Bank. https://documents1.worldbank.org/curated/en/882091485440895147/pdf/WPS7956.pdf

Burns, M. (in press). *Barriers and supports for technology integration: Views from teachers. Background chapter prepared for the Global education monitoring report: Technology and education.* United Nations Educational, Scientific and Cultural Organization.

Chetty, R., Friedman, J., & Rockof, J. (2014). Measuring the impacts of teachers II: Teacher value-added and student outcomes in adulthood. *American Economic Review, 104*(9), 2633–2679.

Darling-Hammond, L. (2000). Teacher quality and student achievement. *Educational Policy Analysis Archives, 8*(1-1). doi:https://doi.org/10.14507/epaa.v8n1.2000

Darling-Hammond, L., & Bransford, J. (2005). *Preparing teachers for a changing world: What teachers should learn and be able to do.* Jossey-Bass.

Dobbie, W., & Fryer, Jr., R. (2013). Getting beneath the veil of effective schools. *American Economic Journal: Applied Economics, 5*(4), 28–60. https://dx.doi.org/10.1257/app.5.4.28

Felch, J., Song, J., & Smith, D. (2010, August 14). Who's teaching L.A's kids? *Los Angeles Times*. http://articles.latimes.com/2010/aug/14/local/la-me-teachers-value-20100815.

Hanushek, E. A. (1992). The trade-off between child quantity and quality. *Journal of Political Economy, 100*(1), 84–117. doi:https://doi.org/10.1086/261808

Hanushek, E. A. (2011). The economic value of higher teacher quality. *Economics of Education Review, 30*, 466–479. https://hanushek.stanford.edu/sites/default/files/publications/Hanushek%202011%20EER%2030%283%29.pdf

Hanushek, E. A. (2012). Low-performing teachers have high costs. *Education Next*. http://hanushek.stanford.edu/publications/low-performing-teachers-have-high-costs

Hanushek, E.A., & Rivkin, S. (2010). Generalizations about using value-added measures of teacher quality. *American Economic Review, 100*(2), 267–271. doi:DOI: 10.1257/aer.100.2.267

Noddings, N. (2012). The caring relation in teaching. *Oxford Review of Education, 38*(6), 771–781. https://doi.org/10.1080/03054985.2012.745047

Organisation for Economic Co-operation and Development. (2009). *Teaching and learning: An international survey. 2008 technical report.* Organisation for Economic Co-operation and Development. http://www.oecd.org/dataoecd/16/14/44978960.pdf

Organisation for Economic Co-operation and Development. (2019a, June). Chapter 5. Providing opportunities for continuous development. In *TALIS 2018 results: Teachers and school leaders as lifelong learners* (Vol. I). https://www.oecd.org/education/talis-2018-results-volume-i-1d0bc92a-en.htm

Organisation for Economic Co-operation and Development. (2019b). *TALIS 2018 technical report.* Organisation for Economic Co-operation and Development. https://www.oecd.org/education/talis/TALIS_2018_Technical_Report.pdf

Organisation for Economic Co-operation and Development. (2020). *Education at a glance 2020: OECD indicators.* OECD Publishing https://doi.org/10.1787/69096873-en.

Reid, K., & Kleinhenz, E. (2015). *Supporting teacher development: Literature review.* Australian Council for Educational Research.

Rockoff, J. (2004). The impact of individual teachers on student achievement: Evidence from panel data. *American Economic Review, 94*(2), 247–252. doi:DOI: 10.1257/0002828041302244

Schleicher, A. (2020). *Teaching and learning international survey 2018: Insights and interpretations.* Organisation for Economic Co-operation and Development: https://www.oecd.org/education/talis/TALIS2018_insights_and_interpretations.pdf

Shulman, L. (1986, February). Those who understand: Knowledge growth in teaching. *Educational Researcher, 15*(2), 4-14. http://www.jstor.org/stable/1175860

Stockard, J., Wood, T. W., Coughlin, C., & Khoury, C. R. (2018). The effectiveness of direct instruction curricula: A meta-analysis of a half century of research. *Review of Educational Research*, *88*(4), 479–507. doi:10.3102/0034654317751919

Section II. Chapter 9

# TEACHER PROFESSIONAL DEVELOPMENT

## Table of Contents

**Best practice:** Distance models for pre- and in-service teacher learning must be governed by the same best practices that apply to face-to-face professional development.

## 9.1 Overview

Good teachers are not born—they develop.

Teachers must cultivate in students the skills, knowledge, and dispositions necessary to succeed in a world that increasingly demands workers who are creative, collaborative problem-solvers, and critical thinkers. They must help students in some of the most poorly resourced environments on earth master the basics of arithmetic, reading, and writing. On top of this, they must confront the learning loss resulting from educational disruptions due to the COVID-19 pandemic school lockdowns, affecting over 800 million students (United Nations Educational, Scientific and Cultural Organization, 2021).

Separately or cumulatively, none of the above tasks is easy. They are even more challenging for teachers in low- and middle-income countries who have often experienced poor pre-service preparation and an absence of ongoing professional learning opportunities (Lauwerier & Akkari, 2015; Popova et al., 2016; Tilak, 2009).

With this realization in mind, distance education programs must be cognizant of two truths. The first is that the distance education platform is not an instructional approach, a form of professional development, or a teacher education curriculum: It is a piece of software. It is what is in the platform—curriculum-based activities that reflect learning outcomes—that matter.

This leads to the second truth. At its core, distance education is teacher education, the ultimate goal of which is to *improve teaching quality to measurably improve students' knowledge and skills*. Minus this awareness and minus the high-quality professional learning opportunities grounded in evidence-based best practices, distance learning programs risk failing teachers and, ultimately, failing their students.

## 9.2 The Professional Development Conundrum

Across the globe, governments have expended enormous amounts of money on continuing teacher professional development (TPD)[1] (Loyalka et al., 2017). These investments often have varied purposes. They can be part of system-required continuing education credits to maintain licensure; certify and upgrade the skills of unqualified teachers or teachers teaching outside their content area; prepare teachers for new roles and responsibilities; help teachers meet new education system requirements (such as reporting or using a new curriculum); promote lifelong learning; move teachers along a career ladder; help teachers improve instruction; or help teachers develop confidence and proficiency with a new innovation, such as technology.

[1] In England, the average cost of TPD for one teacher is £2,950. If all teachers participated in 35 hours annually of high-quality continuing professional development, the cost would be £210 million (US $241 million) per year (Van den Brande & Zuccullo, 2021).

TPD is not simply diverse in its *purposes and content*; it is diverse in its *forms* (Desimone, 2009; Kennedy, 2016). Teachers may participate in all or any of the above activities via courses (online, blended, or face-to-face). They may also read professional literature; attend a conference, a workshop, or lesson study; join professional learning communities, study groups, or peer learning groups; undertake an independent study; or engage in action research. They may use technology for their professional learning via apps such as *Duolingo*; *YouTube* videos; radio or TV broadcasts; Internet research; or *WhatsApp* teacher groups.

TPD is diverse in its *focus.* Many professional development programs are *prescriptive*—demonstrating what they believe to be the best way for teachers to address a particular teaching problem—and often promote compliance and fidelity of implementation (Kennedy, 2016, pp. 10–11). Others concentrate on *strategies*—modeling intended behaviors to attain a particular goal and granting teachers the discretion to apply strategies as they deem necessary (Kennedy, 2016, p. 11). Some professional development programs focus on fostering *insights*—"raising questions that force teachers to re-examine familiar events and come to see them differently" so that their potential "alteration of behavior" is internally driven and based on choice (Kennedy, 2016, p. 11). And other types of TPD, such as online courses or summer seminars, focus on building *knowledge*, giving teachers "maximum discretion regarding whether or how to do anything with that knowledge" (Kennedy, 2016, p. 13).

TPD is diverse in terms of who "does" it. Universities, foundations, for-profit companies, content area experts, teachers' unions, industry partners, technology companies, media (radio and TV stations), ministries of education, agencies within ministries of education, school principals, non-governmental organizations, civil society organizations, other schools, principals, coaches, mentors, master teachers, teacher colleagues—and teachers themselves as part of self-learning—all provide TPD.

And TPD also is diverse in terms of who "gets" it. Professional development opportunities may include all teachers at a school, one teacher at a school, permanent teachers, permanent teachers and long-term substitutes, all teachers plus their assistant teachers or para teachers, teachers from certain grades or subject areas, department heads, school leadership teams, new teachers, "at-risk" teachers, "champion" teachers, or the same set of teachers who are almost always chosen to attend every professional development session.

Given such diversity, it is not surprising that researchers often have struggled to identify the effectiveness of teacher professional development programs, who does them, the various strategies or components that are comprised by them, and the role that individual programs play in improving both the quality of teaching and student achievement (Desimone, 2009).

Connecting teacher effectiveness to improved student learning outcomes has been a significant challenge generally but demonstrating convincing evidence of the impacts of teacher professional development at scale has been particularly vexing in the world's poorest contexts (Popova et al., 2016; Reid & Kleinhenz, 2015, p. 15). This challenge arises from several possible causes:

- **Methodological issues regarding research,** such as design issues, insufficient samples, measures that are not comparable across sites, and issues of external validity (Burns, 2021)
- **A lack of generalizable knowledge** about the specific features of such programs that effectively improve student learning (Audisio et al., 2022, pp. 2–3; Hill et al., 2022)
- **A relative dearth of research** on how to prove the effect of particular teacher professional development programs in challenging contexts, such as conflict and crisis situations (Burns & Lawrie, 2015)
- **Design and delivery issues in TPD programs in the Global South**—primarily a program's theory of change and program delivery mechanisms—

often asynchronous online courses or, in face-to-face settings, the "cascade" or "train-the-trainers" approach (discussed below)

- Concerns about the quality and experience of teacher educators and professional development providers (Kennedy, 2016; Ono & Ferreira, 2010). There is also little research on "the qualities that constitute expertise in terms of teacher professional development providers and how they are selected, prepared and their efficacy assessed" (Kennedy, 2016, p. 29).

## 9.3 High-Quality Professional Development

One way of navigating the complexity and diversity of teacher professional development is to focus on the "measurable critical features" of teacher professional development (Desimone, 2009, p. 183). The previous chapter, "Developing 'Good' Teachers," identifies a core set of competencies needed for good teaching—strong content knowledge, content-specific pedagogical, and general instructional skills along with an understanding of child and adolescent development and a strong sense of efficacy. Professional development programs that positively affect student learning to successfully prepare teachers in these areas typically include the following programmatic features: (a) content focus, (b) active learning, (c) coherence, (d) duration, (e) collective participation, and (f) continuous support (Kennedy, 1999; Loucks-Horsley et al., 2010; Shulman, 1986). Each is discussed below.

### 9.3.1 Focus on Curriculum and Instruction, Not Just Content

As discussed in the previous chapter, teachers' content knowledge is significantly linked to *student* content knowledge (Heller et al., 2012). Thus, over the years, most research has suggested that professional development activities focus on teachers' knowledge of content and how students learn that content (Darling-Hammond et al., 2017b; Darling-Hammond et al., 2009; Desimone & Stuckey, 2014).

**Figure 9.1**
**Standards for Professional Learning Across the Globe**

Standards for teacher professional development are far less common than the teaching standards discussed in Chapter 8 or the standards for quality online instruction discussed in Chapter 13. Many nations use their own national teaching standards to frame the contours and content of teacher professional development. Others may use international standards. Below are a few examples of standards for TPD:

Learning Forward's 2022 *Standards for Professional Learning* focuses on conditions for success, rigorous content, and transformational processes (Learning Forward, 2022).

The United Kingdom's *Standards for Teachers' Professional Development* establish *the minimum requirements for teachers professional development* (Government of the United Kingdom Department for Education, 2016).

Singapore's *Teacher Education Model for the 21st Century* focuses on the values, skills, and knowledge that guide the design and delivery of teacher professional learning at the National Institute for Education, which is responsible for all teacher formal learning in Singapore (National Institute of Education, 2010).

While not a set of teacher standards, *per se*, Boston College's Trends in International Mathematics and Science Study (TIMMS) & Progress in International Reading Literacy Study (PIRLS) Education Center includes a searchable database of 70 countries with information on professional development for math and science teachers (Mullis et al., 2016). Search for "teacher professional development" or use the dynamic menu to access this information.

Yet both established and recent research suggests that teacher subject matter proficiency—while important—is not enough to affect changes in student learning (Ball et al., 2008). Nor do modest improvements in teachers' content knowledge result in meaningful improvements in instructional quality or student outcomes (Hill et al., 2022).

What matters more appears to be a focus on knowledge *for* teaching, pedagogical content knowledge, and how to integrate these skills to advance curricular goals (Ball et al., 2008; Heller et al., 2012, p. 337; Hill, 2020; Shulman, 1986). TPD programs that help teachers understand why and when to apply certain content-specific instructional approaches, that combine content with an analysis of how students learn, and that focus on curriculum and instruction result in more positive student learning outcomes than professional development that focuses on higher-level content alone (Heller et al., 2012; Hill, 2020; Hill et al., 2022).

### 9.3.2 Active and Reflective Learning

When professional development efforts fail to bear fruit, as is so often the case, it is often because the professional development is overly theoretical and thus difficult for teachers to implement, or that the delivery is rote and passive, thus failing to engage teachers—or both (Loyalka et al., 2017, p. 7).

Thus, to be effective, professional development must provide opportunities for teachers to engage in active learning. This can involve teachers observing one another teach and giving and receiving feedback, analyzing student work, designing learning activities, or simulating the role of students as they learn a new technology tool or instructional approach. Professional development that is active provides teachers with time to work on the craft of teaching—time for modeling, design, practice, and revision of activities and strategies that teachers will incorporate into their daily routines (Darling-Hammond et al., 2017a; Desimone & Stuckey, 2014; Joyce & Showers, 2002; Kraft et al., 2018).

But professional development also must combine this action with reflection, by incorporating metacognitive and reflective strategies (Boethel & Dimock, 1999). The active element of learning, particularly when teachers assume the role of students in more experiential professional development activities, should be accompanied by teachers reflecting on learning from the point of view of a student, examining which strategies best help students learn, linking this information to their own practices, and thinking through how to more closely align their instruction with optimal learning (Dimock et al., 2001; Education Development Center, 2014; Orr et al., 2013; Timperley et al., 2007).

### 9.3.3 Coherence

The third core feature emphasized in the literature on quality teacher professional development is coherence. Coherence refers to teacher professional development that is (1) aligned with standards designed to promote the beliefs, knowledge, and skills that teachers should possess (See Figure 9.1); (2) grounded in the latest research in a domain; (3) focused on addressing teachers' knowledge and beliefs; and (4) consistent with larger district, state, provincial, and/or national educational regulations, goals, policies and priorities (Darling-Hammond et al., 2017b; Darling-Hammond et al., 2009; Desimone & Stuckey, 2014).

### 9.3.4 Sufficient Duration

Episodic professional development often fails to lead to changes in teachers' beliefs, practices, and effectiveness (Darling-Hammond et al., 2017b; Darling-Hammond et al., 2009; Kraft & Blazar, 2018; Orr et al., 2013; Yoon et al., 2007). Research has typically shown that behavioral and pedagogical change require professional development activities of sufficient duration, including both the span of time over which they occur (e.g., one day or one semester) and the number of hours spent in the activity. For example, Darling-Hammond et al. (2017a) note the effectiveness of 20 hours or more of professional contact time per year. Yoon et al. (2007) report TPD that offered an average of 49 hours of development per year had an associated average boost in student achievement of 21 percentile points. Other research corroborates this, suggesting that professional development spread over a long duration (a semester or intense summer institutes with follow-up during the semester) appears to be more effective than shorter episodes of professional development (Desimone & Stuckey, 2014; Hennessy et al., 2016; Yoon et al., 2007; Hennessy, et al., 2022).

More recent research calls this belief into question, suggesting that there is no optimal duration, and that program duration does not explain differences in the magnitude of TPD's impact on student learning (Audisio et al., 2022; Didion et al., 2019; Hill et al., 2022). Hill et al. (2022), marshalling evidence from a series of studies, suggest that time-intensive TPD programs that lead to modest improvements in teachers' content knowledge do *not* result in meaningful improvements in instructional quality or student outcomes. Thus, it is not the amount of time teachers have; rather it is what they do with the time they have (Burns & Lawrie, 2015; Hill et al., 2022). Simply extending the period of TPD implementation is no guarantee for greater program impact; rather, there should be more sustained efforts over the time allotted (Kraft, 2020, as cited in Audisio et al, 2022).

### 9.3.5 Collective Participation

A fifth critical feature is collective participation. This can be accomplished through involvement of teachers from the same school, grade, or department. Such arrangements set up potential interaction and discourse, which can be a powerful form of teacher learning. Teacher collaboration has long been recognized as a crucial element of high-impact professional development (Organisation for Economic Co-operation and Development, 2019). By including a critical mass of teachers from the same school in collaborative TPD, teachers can begin to identify and address problems and create communities that positively change the culture and instruction of their entire grade level or school, thus promoting school change (Darling-Hammond et al., 2017b, p. v; see also Dimock et al., 2001). A corollary of collective participation is that the professional development is school based, with teachers working together on problems of practice in their places of practice (Ball et al., 2008; Kraft et al., 2018).

### 9.3.6 Ongoing Support and Follow-up

Evidence regarding the importance of school-based follow-up support as part of continuing teacher professional development is extensive, although not without limitations (Loyalka et al., 2017). Research from both the Global North and Global South, and from refugee settings, consistently indicates that follow-up support can improve teachers' fidelity of implementation and transfer of learning (Burns, in press; Burns & Lawrie, 2015; Darling-Hammond et al., 2017b; Didion et al., 2019; Dimock et al., 2001; Fixsen, et al., 2005; Education Development Center, 2014; Hill, 2020; Hill et al., 2022; Kraft et al., 2018; Mendenhall et al., 2017; Orr et al., 2013; Popova et al., 2016; Reid & Kleinhenz, 2015; Timperley et al., 2007).

Popova et al. (2016) report that supportive follow-up improves program impact on learning by a 0.26 standard deviation versus follow-up for monitoring and accountability or no follow-up (Popova et al, 2016, p. 19). Without this logistical, conceptual, technical, and instructional support, teachers abandon innovations and new methods in favor of "reversion to traditional teaching methods" (Tatto, 2004, as cited in Burns, in press).

Thus, high-quality professional development that embodies the above characteristics can improve teachers' knowledge and skills and change their attitudes and beliefs. Together, such improvements in turn, influence and change their instruction, which has in many cases resulted in measurably improved student learning outcomes (Blank & de las Alas, 2009; Desimone, 2009; Hill et al., 2022; Kraft et al., 2018).

High-quality teaching demands high-quality professional development. And high-quality professional development demands time and resources. Education systems that are recognized for having high-quality teachers and high student achievement levels typically also offer teachers extensive and rigorous professional development opportunities. They also provide teachers with the release time and support necessary to enhance their qualifications. For example, the

Singaporean government pays its teachers for 100 hours of professional development each year, in addition to granting them 20 hours per year to visit one another's classrooms to observe lessons and to work with other teachers on lesson design (Darling-Hammond et al., 2017a). South Korean teachers are required to take 90 hours of professional development courses every three years, most of which they do online (95% of primary school teachers participate in online courses or seminars annually) as well as via other formats. Additionally, 84% of South Korean primary school teachers participate in coaching and observation annually (Organisation for Economic Co-operation and Development, 2022).

In educational jurisdictions noted for quality teaching—Alberta (Canada), Australia, Austria, Latvia, Lithuania, and Shanghai (China)—99% of teachers participated in professional development in the 2017–2018 school year (Organisation for Economic Co-operation and Development, 2019). Many of these countries also provide time for teachers' professional development by integrating it into the workday and providing class coverage from other teachers. Even in countries like Saudi Arabia and France, which have traditionally had low levels of teacher participation in professional development, 86% and 83% of Saudi and French teachers, respectively, participated in TPD in the 2017-2018 school year (Organisation for Economic Co-operation and Development, 2019).

## 9.4 Models of Professional Development

As previously discussed, teacher professional development varies greatly in how learning is organized for teachers and the methods employed to develop teacher skills. On average, the most common forms of professional development in which teachers participate in OECD countries, according to teachers themselves, are "courses/seminars attended in person" (76%); "reading professional literature" (72%); and "education conferences where teachers, principals, and/or researchers present their research or discuss educational issues" (49%) (Organisation for Economic Co-operation and Development, 2019).

The choices are even more constrained for non-OECD teachers, particularly in low- and middle-income countries[2] and especially in bilateral or multilateral donor-funded programs. In these contexts, teachers often experience one model of teacher professional development—the workshop or "training" model, often as part of a "cascade" or "train-the-trainers" approach.

### 9.4.1 Workshops

Workshops (or trainings or seminars) typically take place in some central location, in a facility with relatively good infrastructure and amenities, and occur once to several times per year. Workshops are useful in exposing people to the latest ideas and techniques and to colleagues; they attempt to promote standardization, uniformity, and equity of access to learning; and, as a one-to-many form of teacher professional development, they promise scale (Burns, 2018). Workshops also can be presented online, as in the proliferation of live *Zoom* webinars or trainings.

They also have multiple drawbacks. They are short-term and episodic, turning learning into an event versus a process. They are often *in vitro* versus *in vivo* forms of TPD—occurring in hotel conference rooms or on *Zoom* versus in the teacher's workplace. They can promote a didactic and hierarchical form of learning—an expert (often international) transmits professional learning as part of a larger cascade approach (discussed next). Research on workshops, particularly single workshops, shows limited effectiveness (Blazar et al., 2022; Didion et al., 2019). A workshop does little to help teachers at the most critical juncture in their learning—the point at which they return to school to implement

[2] The OECD is an intergovernmental organization comprising 38 mostly high-income countries.

what they learned. This failure drives the high degree of latency and leakage, failure of learning transfer, and poor fidelity of implementation that are associated with workshops (Burns, 2018).

### 9.4.2 Cascade or Train-the-Trainers Approach

Because of the need to address the skills of so many teachers, build capacity throughout the education system, and "scale" innovations, government and donor-funded teacher professional development initiatives often employ a cascade or train-the-trainers approach. Popova et al. (2016) found that half of the TPD programs they studied in the Global South used the cascade delivery model. This approach is also used online.

Conceptually, the cascade has an intuitive, even seductive, logic. Those who are trained train others, who then train others, and so forth. As a purely theoretical model of diffusion and capacity building, the cascade has much to commend it. It promises *scale*—an exponential increase in the number of teachers trained. It promises *sustainability*—leveraging local resources to increase human and social capital in a cost-effective manner. It promises *equity*—democratizing access to learning for the greatest number of recipients across a system. It promises *quality*—training occurs in stages so outcomes can be analyzed, and inputs improved stage-wise. Its most seductive feature is that it is viewed as *cost-effective*—a small amount of investment in initial training yields a higher rate of return on initial investment (Burns, 2014[3]).

However, the train-the-trainers model has consistently been shown to suffer from a host of design and delivery flaws—a trickle-down, one-size-fits-all approach favoring quantity over quality. As research makes clear, this quality degrades as it spirals down from one level of the cascade to the next. Piecemeal or *ad hoc* transfer of the innovation, a complete lack of transfer of learning, and poor fidelity of implementation are all associated with the cascade approach and far outweigh any perceived benefits (Gathumbi et al., 2013, pp. 8, 11; see also Bett & Boylan, 2016; Burns, 2014; Dadds, 2014; Dichaba & Mokhele, 2012; Turner et al., 2014).

There are some ways in which the cascade can be made more effective: designing support at each level of the cascade—focusing on simple, easily replicable innovations versus complex ones; relaxing expectations about fidelity of implementation and allowing modification and adaptation of an innovation (which as Chapter 1 notes, carries its own risks); diffusing expertise throughout the cascade versus concentrating it more narrowly at the top among master trainers; and involving a cross-section of teachers from all levels of the cascade to participate in the development of materials (Burns, 2014; Turner et al., 2014).

### 9.4.3 School-Based Models of Teacher Professional Development

The variation of different models of teacher professional development makes it difficult to identify the effect of specific features of professional development interventions on particular aspects of teacher or student outcomes, or to advocate for the superiority of one model of professional development over another (Desimone, 2009). There are, however, numerous school-based professional development models to complement or supplant workshops. These teacher-driven, interactive models allow teachers to deeply explore their craft and wrestle with problems of practice (Blank & de las Alas, 2009; Didion et al., 2019; Dudley, 2019; Loucks-Horsley et al., 2010; McAleavy, 2021; Organisation for Economic Co-operation and Development (OECD), 2009). For example, coaching and mentoring, which will be discussed in Chapter 16, have a robust evidence base both in supporting standard forms of professional

[3] This is taken verbatim from Burns, M. (2014). A Tale of Two Teachers. *Global Partnership for Education, Education for All Blog*: https://www.globalpartnership.org/blog/tale-two-teachers. Used with permission from GPE.

development and as a stand-alone form of professional development (Burns, 2013; Cilliers et al., 2021; Desimone, 2009; Fixsen et al., 2005; Hill, 2020; Ingersoll & Strong, 2011; Kraft et al., 2018).

Figure 9.2 examines five of these school-based models of professional development—lesson study, open classrooms, case studies, Looking at Student Work (LASW), and study groups. These professional development examples have been selected because they have data supporting their efficacy. Although primarily conducted in face-to-face settings, these also can be carried out as part of an online or blended professional development offering.

**Figure 9.2**
**Models of Teacher Professional Development**

| Professional Development Model | Activity Phases | Results |
|---|---|---|
| **Lesson Study** | Lesson Study involves groups of teachers collaboratively planning, teaching, observing, and analyzing learning and teaching in "research lessons." Lesson Study involves:<br>• Goal setting and planning—including the development of the lesson plan<br>• Teaching the research lesson; enabling the lesson observation and the post-lesson discussion<br>• Consolidation of learning (Doig & Groves, 2011)<br><br>Over this cycle of research, teachers innovate or refine a pedagogical approach or lesson that they share with colleagues (Dudley, 2019, p. 1). | • An examination of Lesson Study activities in Zambia reports that it helped teachers to develop their ideas and experiences of different approaches to teaching; think deeply about specific and general aspects of teaching; "learn to see children; "and develop professional communities of inquiry (Doig & Groves, 2011).<br>• After 3 years of Lesson Study in Zambia's Central Province, students' pass rates were 12.4% higher in physics and chemistry and 19.2% higher in biology versus students in other provinces. After 5 years, the Ministry of Education found continued improvement among students' science pass rates (from 53% in 2009 to 63% in 2013), as well as in mathematics (from 40% in 2009 to 49% in 2013) (Jung et al., 2016).<br>• Higher levels of Lesson Study practice in schools were correlated with higher student achievement on national exams (Jung et al., 2016). |
| **Open Lessons/ Classrooms**<br><br>**("Peer Lessons")** | • A "sharing teacher" designs a lesson and invites other teachers ("observing teachers") to attend.<br>• Observing teachers focus on the sharing teacher (not on learners). This in part distinguishes Open Lessons from Lesson Study.<br>• After school, or the next day, all teachers—observing teachers and sharing teachers—meet. Observing teachers ask questions about the lesson (for their own benefit) and provide feedback to the sharing teacher. | • Where there is structured feedback, time for discussion, and teacher incorporation of feedback into a future lesson, Open Lessons can help teachers build on and refine skills (Loucks-Horsley et al., 2010).<br>• Teachers must observe another teacher engaged in *successful* performance (Loucks-Horsley et al., 2010).<br>• Observations and modeling are more effective for observers when the model being observed is similar to themselves (Hendry & Oliver, 2012). |

| Professional Development Model | Activity Phases | Results |
|---|---|---|
| **Open Lessons/ Classrooms**<br><br>**("Peer Lessons")**<br>*(continued)* | • A facilitator can use protocols to structure conversations around the lessons they observed to avoid evaluation or judgment and keep conversations more inquiry focused.<br>• Examples have been documented in Azerbaijan, the Russian Federation, Shanghai, and in many schools in Ireland and the United States (Burns, in press). | • The structure and execution of Open Lessons must be designed and executed in such a way that modeling teachers don't feel "judged" (Hendry & Oliver, 2012, p. 8).<br>• Open Lessons build social capital of the school by making private practice public (Burns, in press). |
| **Case Studies** | • The topic of study is identified (e.g., managing student behavior, asking probing questions) and cases identified (readings, scenarios, or videos) to study.<br>• Teachers view videos in small increments and discuss at length what they've viewed, using guiding questions. They also may view the video in its entirety and look for one element per viewing—for example, classroom organization strategies.<br>• The case can be hypothetical and inductive, since teachers are interpreting and inferring what they see and why they see it.<br>• The above sequence continues over a period of time until teachers finish with their case. At this point, they compile what they have learned for application to the classroom.<br>• Ideally, teachers should create an action plan for some new technique/strategy they will employ, and then be observed and provided feedback by a facilitator or other teachers.<br>• Case Study involves investigation, study, readings, reflection, journal logs, alternative scenarios, memoranda of understandings, or reflections based on what teachers have viewed and discussed (Loucks-Horsley et al., 2010; Hendry & Oliver, 2012, p. 264).<br>• Case Studies can use video observations to assess both classroom instruction and teacher learning experiences and have the potential to offer rich data that capture the complexity of interactions (Desimone, 2009). | • Students whose teachers participate in case studies of classroom teaching, followed by teaching based on these cases, achieved greater learning gains as determined by pre- and post-test science content exams than students whose teachers received content training only (Darling-Hammond et al., 2017a, p. 6).<br>• Statistical analyses linked these gains in student learning with "teachers' science content knowledge, pedagogical content knowledge about student thinking, and their ability to create a cohesive science content storyline" (Roth, 2011, as cited in Darling-Hammond, Hyler, & Gardner, Effective Teacher Professional Development, 2017a, p. 6).<br>• Professional development of moderate duration—in this case, one 24-hour course—can have considerable and lasting impact on teaching and learning in elementary science (Heller et al., 2012) |

| Professional Development Model | Activity Phases | Results |
|---|---|---|
| **Looking at Student Work** | • Looking at Student Work (LASW) is a model of teacher collaborative self-study and formative assessment that focuses on examining student work and assessing the way the teacher designed the particular activity being reviewed. It involves phases (e.g., presenting student work, posing guiding questions, receiving focus feedback, and reflection).<br>• LASW is designed to help teachers:<br>◦ Examine students' ideas as they pertained to key concepts in the unit of study<br>◦ Recognize evidence of incorrect mental models, foster correct understandings, and increase proficiency<br>◦ Analyze tasks to identify characteristics that support formative assessment<br>◦ Make instructional choices grounded in evidence of student thinking (Heller et al., 2012) | • Sizable content test score gains for teachers with effect sizes close to 2.0 and over 1.0 a year later (Heller et al., 2012).<br>• Students whose teachers participated in LASW showed significant increases in content test scores compared to control group students, both in the study year and for students in treatment teachers' classes a year later. Effect sizes ranged from 0.4 to 0.6 for students in the study year and were even stronger (0.5–0.8) the following year (Heller et al., 2012).<br>• Teachers with more experience attending to their students' scientific thinking began to use different assessments to gain better information about their teaching (Schneider & Plasman, 2011). |
| **Study Groups** | • Teachers agree to meet over a period of weeks or months to study a particular issue (for example, improving students' writing abilities).<br>• Teachers discuss chapters of a proposed book, Internet resources, or video selected to be the study "text" to address this issue.<br>• Teachers can prepare some classroom action (activity, a new strategy for teaching science, the use of new materials) and prepare to use this in their classrooms. Ideally, the facilitator and other Study Group colleagues could observe and offer feedback. Traditionally, teachers try the intervention alone and report on how it went.<br>• If teachers find common implementation problems, they may identify strategies to address these or identify a further topic to study. | • Less prescriptive interventions, such as teacher Study Groups, have a greater impact on learning than do those delivering a set of prescribed teaching behaviors (Kennedy, 2016).<br>• Firestone et al. (2020) cite a body of evidence-based research pointing to the direct effects of Study Groups on teacher knowledge, instruction, and improved student learning as measured by student test scores.<br>• Heller et al. (2012) show mixed results of Study Groups on student learning. |

Format notwithstanding, the professional development in which teachers participate, whether in person or via distance, above all must be of the highest quality. While low-quality professional development may *slightly* help the least qualified teachers, it has a negative impact on more qualified ones[4] (Loyalka et al., 2017). Simply put, poor professional development can do harm.

However, no professional development format can be effective enough to redress weaknesses in overall teacher quality. As Schleicher (2012) notes, a strong professional development system can exist only within an education system that does the following:

- Emphasizes recruiting, preparing, supporting, and compensating teachers on the front end rather than reducing teacher attrition and firing weak teachers on the back end
- Provides teachers with regular and effective support that directly addresses the instructional challenges where they teach
- Evaluates teachers on a variety of indicators that provide formative feedback useful in improving instruction and on multiple indicators for summative performance evaluation
- Engages teachers in the design of curriculum, instruction, and assessment so that they are aligned, and strengthens teachers' understanding of how to reach agreed standards

## 9.5 Conclusion

Teacher education—both initial education and continuing professional development (CPD) throughout a teacher's career—has been lauded as the "most direct and effective approach to school improvement" (Fletcher-Wood & Zuccollo, 2020, as cited in Perry et al., 2021, p. 1).

But for this to be true, high-quality professional development must yield changes in three areas—teacher knowledge, teachers' instructional practices, and student achievement. It should address the five areas we know foster good teaching: content, instruction, pedagogical content knowledge, knowledge of learning and development, and efficacy. It must be grounded in evidence of what works; differentiated based on teachers' needs and realities; provide opportunities for teachers to view the intended practice, study it, plan, and design for application in the classroom; and encourage teachers to practice new behaviors or innovations and receive support and feedback so they can revise and improve implementation.

At its core, distance learning is not about the mode of delivery but about the quality of the learning opportunities provided to those who are, or wish to become, teachers. Distance learning for teachers *is* professional development—as such, it must be governed by the same high standards as in-person teacher professional learning. Developing, building, improving, or changing the skills of any professional is a complex and arduous task, but fortunately in the case of teachers, it is one that comes with some general guidelines outlining the contours for success.

The remaining chapters of this guide, from instruction to technology, lay out a path toward high-quality professional development in a distance environment. This path is not always straightforward, and some teachers and programs may not reach their final destination. However, distance education programs can help teachers reach this goal by:

- Designing high-quality learning experiences
- Employing evidence-based instructional practices and assessments for learning
- Creating and procuring engaging and well-designed content for learning
- Preparing instructors and learners to teach and learn via distance technologies

[4] Mainly for students of qualified teachers, in part due to the negative impact of having their teachers absent from the classroom.

- Designing and nurturing communities of practice among learners
- Offering ongoing support to distance learners
- Evaluating distance education offerings and revising accordingly
- Ensuring quality
- Selecting appropriate technologies that promote high-quality learning

These methods are discussed in the remaining chapters of this guide.

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## References

Audisio, A., Taylor-Perryman, R., Tasker, T., & Steinberg, M. (2022). *Does teacher professional development improve student learning? Evidence from leading educators' teacher fellowship model. (EdWorkingPaper: 22-597).* Annenberg Institute at Brown University. https://doi.org/10.26300/ah2f-z471

Ball, D., Thames, M., & Phelps, G. (2008). Content knowledge for teaching: What makes it special? *Journal of Teacher Education, 59*(5). https://doi.org/10.1177/0022487108324554.

Bett, H., & Boylan, M. (2016, January 28). The cascade model of teachers' continuing professional development in Kenya: A time for change? *Cogent Education*. doi:https://www.tandfonline.com/doi/full/10.1080/2331186X.2016.1139439

Blank, R., & de las Alas, N. (2009). Effects of teacher professional development on gains in student achievement. *Council of Chief State School Officers*. https://files.eric.ed.gov/fulltext/ED544700.pdf

Blazar, D., McNamara, D., & Blue, G. (2022). *Instructional coaching personnel and program scalability (EdWorking paper: 21-499).* Annenberg Institute at Brown University: https://doi.org/10.26300/2des-s681

Boethel, M., & Dimock, K. (1999). *Constructing knowledge with technology: An overview of the literature.* Southwest Educational Development Laboratory.

Burns, M. (2013, December). Staying or leaving? Designing for persistence in an online educator training program in Indonesia. *Open Learning: The Journal of Open and Distance Learning, 28*(2), 141–152. doi: http://dx.doi.org/10.1080/02680513.2013.851023

Burns, M. (2014, May 27). A tale of two teachers. *Global Partnership for Education | Education for All Blog*. https://www.globalpartnership.org/blog/tale-two-teachers

Burns, M. (2018, June 12). Workshops 101 for teacher professional development. *Global Partnership for Education| Education for All Blog*. https://www.globalpartnership.org/blog/workshops-101-teacher-professional-development

Burns, M. (2021). *Background paper prepared for the 2023 Global education monitoring report, Technology and education: Technology in education.* United Nations Educational, Scientific and Cultural Organization. https://unesdoc.unesco.org/ark:/48223/pf0000378951

Burns, M. (in press). *Barriers and supports for technology integration: Views from teachers. Background chapter prepared for the Global education monitoring report: Technology and education.* United Nations Educational, Scientific and Cultural Organization.

Burns, M., & Lawrie, J. (Eds.). (2015). *Where it's needed most: Quality professional development for all teachers*. Inter-agency Network for Education in Emergencies. https://tinyurl.com/jb3zs5bw

Cilliers, J., Fleisch, B., Kotzé, J., Mohohlwane, N., Taylor, S., & Thulare, T. (2021). *Can virtual replace in-person coaching? Experimental evidence on teacher professional development and student learning.* RISE Working Paper Series 20/050. https://doi.org/10.35489/BSG-RISE-WP_2020/050.

Dadds, M. (2014). Continuing professional development: Nurturing the expert within. *Professional Development in Education, 40*(1), 9–16. https://doi.org/10.1080/19415257.2013.871107

Darling-Hammond, L., Wei, R., Andree, A., Richardson, N., & Orphanos, S. (2009). *Professional learning in the learning profession.* National Staff Development Council.

Darling-Hammond, L., Hyler, M., & Gardner, M. (2017a). *Effective teacher professional development.* Learning Policy Institute. https://learningpolicyinstitute.org/product/effective-teacher-professional-development-report

Darling-Hammond, L.; Burns, D.; Campbell, C.; Gooodwin , A.L.; Hammerness, K.; Ling Low, E.; McIntyre, A.; Sato, M.; & Zeichner, K. (2017b). *Empowered educators: How high-performing systems shape teaching quality around the world.* National Center on Education and the Economy.

Desimone, L. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational Researcher, 38*(3), 181–199. https://doi.org/10.3102/0013189X08331140

Desimone, L., & Stuckey, D. (2014). Sustaining teacher professional development. In L. Martin, S. Kragler, D. Quatroche, & K. Bauserma (Eds.), *Handbook of professional development in education: Successful models and practices, pre-k-12* (pp. 467–482). Guilford Publications.

Dichaba, M., & Mokhele, M. (2012). Does the cascade model work for teacher training? Analysis of teachers' experiences. *International Journal of Educational Sciences, 4*(3), 249–254. https://doi.org/10.1080/09751122.2012.11890049

Didion, L., Toste, J., & Filderman, M. (2019). Teacher professional development and student reading achievement: A meta-analytic review of the effects. *Journal of Research on Educational Effectiveness, 13*(1), 29–66. https://doi.org/10.1080/19345747.2019.1670884

Dimock, K. V., Burns, M., Heath, M., & Burniske, J. (2001, December). *Applying technology to restructuring learning: How teachers use computers in technology assisted constructivist learning environments.* Southwest Educational Development Laboratory.

Doig, B., & Groves, S. (2011). Japanese lesson study: Teacher professional development through communities of inquiry. *Mathematics Teacher Education and Development, 13*(1), 77–93. https://files.eric.ed.gov/fulltext/EJ960950.pdf

Dudley, P. (2019). *Lesson study: A handbook.* Lesson Study UK. https://lessonstudy.co.uk/wp-content/uploads/2012/03/new-handbook-revisedMay14.pdf

Education Development Center. (2014). *When teachers understand what they're doing, students learn: Evidence from EDC's reading program in the Democratic Republic of the Congo.* Education Development Center.

Firestone, A., Cruz, R., & Rodl, J. (2020). Teacher study groups: An integrative literature synthesis. *Review of Educational Research, 90*(5), 675–709. https://doi.org/10.3102/0034654320938128

Fixsen, D., Naoom, S., Blasé, K., Friedman, R., & Wallace, F. (2005). *Implementation research: A synthesis of the literature.* University of South Florida, Louis de la Parte Florida Mental Health Institute, The National Implementation Research Network (FMHI Publication #231). doi:10.1.1.610.6226

Gathumbi, A., Mungai, N., & Hintze, D. (2013). Towards comprehensive professional development of teachers: The case of Kenya. *International Journal of Process Education, 5*(1), 3–14.

Government of the United Kingdom Department of Education. (2016). *Standards for teachers' professional development*. Department of Education Gov.UK. https://www.gov.uk/government/publications/standard-for-teachers-professional-development

Heller, J., Daehler, K., Wong, N., Shinohara, M., & Miratrix, L. (2012). Differential effects of three professional development models on teacher knowledge and student achievement in elementary science. *Journal of Research in Science Teaching, 49*(3), 333–362. https://scholar.harvard.edu/files/lmiratrix/files/differential_effects_of_three_professional_development_models_on_teacher_knowledge_and_student_achievement_in_elementary_science_2012.pdf

Hendry, G., & Oliver, G. (2012). Seeing is believing: The benefits of peer observation. *Journal of University Teaching and Learning Practice, 9*(1), 1–11. doi:10.15373/2249555x/may2013/114

Hennessy, S., D'Angelo, S., McIntyre, N., Koomar, S., Kreimeia, A., Cao, L., . . . Zubairi, A. (2022). Technology use for teacher professional development in low- and middle-income countries: A systematic review. *Computers and Education Open, 3.* EdTech Hub. https://doi.org/10.1016/j.caeo.2022.100080

Hennessy, S., Haßler, B., & Hofmann, R. (2016). Pedagogic change by Zambian primary school teachers participating in the OER4Schools professional development programme for one year. *Research Papers in Education, 31*(4), 399–427. https://doi.org/10.1080/02671522.2015.1073343

Hill, H. (2020, February 21). Teacher PD gets a bad rap. But two approaches do work. *Education Week*. https://www.edweek.org/leadership/opinion-teacher-pd-gets-a-bad-rap-but-two-approaches-do-work/2020/02

Hill, H., Papay, J., & Schwartz, N. (2022). *Dispelling the myths: What the research says about teacher professional learning.* The Research Partnership for Professional Learning. Annenberg Institute for School Reform at Brown University.

Ingersoll, R., & Strong, M. (2011, June). The impact of induction and mentoring programs for beginning teachers: A critical review of the research. *Review of Education Research, 81*(2). https://doi.org/10.3102/0034654311403323

Joyce, B., & Showers, B. (2002). *Student achievement through staff development* (3rd ed.). Association for Supervision and Curriculum Development.

Jung, H., Kwauk, C., Nuran, A., Perlman Robinson, J., Schouten, M., & Sheikh Islam, T. (2016, July). *Lesson study, Scaling up peer-to-peer learning for teachers in Zambia.* Center for Universal Education Brookings Institute. http://dx.doi.org/10.2139/ssrn.3956230

Kennedy, M. (1999). The role of preservice teacher education. In L. Darling-Hammond, & G. Sykes (Eds.), *Teaching as the learning profession: Handbook of teaching and policy* (pp. 54–86). Jossey Bass.

Kennedy, M. (2016). How does professional development improve teaching? *Review of Educational Research, 86*(4), 945–980. doi:https://doi.org/10.3102/0034654315626800

Kraft, M. A., Blazar, D., & Hogan, D. (2018). The effect of teacher coaching on instruction and achievement: A meta-analysis of the causal evidence. *Review of Educational Research, 88*(4), 547–588.

Kraft, M., & Blazar, D. (2018). Taking teacher coaching to scale. *Education Next, 18*(4), 68–74. Education Next. https://www.educationnext.org/taking-teacher-coaching-to-scale-can-personalized-training-become-standard-practice/

Lauwerier, T., & Akkari, A. (2015). *Les enseignants et la qualité de l'éducation de base en Afrique subsaharienne. Recherche et prospective en éducation [Réflexions Thématiques, N° 11].* UNESCO.

Learning Forward. (2022). *Standards for professional learning*. Learning Forward. https://standards.learningforward.org/

Loucks-Horsley, S., Stiles, K., Mundry, S., Love, N., & Hewson, P. W. (2010). *Professional development for teachers of mathematics and science.* Corwin Press.

Loyalka, P., Popova, A., Li, G., Liu, C., & Shi, H. (2017). *Unpacking teacher professional development. REAP Working Paper 314.* Stanford Center on Global Policy and Development: https://kingcenter.stanford.edu/sites/g/files/sbiybj16611/files/media/file/1009wp_0.pdf

McAleavy, T. (2021, December). *Transforming teacher professional development: A case study from England.* Education Trust. https://www.educationdevelopmenttrust.com/our-research-and-insights/commentary/transforming-teacher-professional-development-a-ca

Mendenhall, M., Bowden, L., Cha, J., Collas, S., Falk, D., French, S., . . . Skinner, M. (2017). *Strengthening teacher professional development: Local and global communities of practice in Kakuma Refugee Camp, Kenya.* https://www.eccnetwork.net/resources/strengthening-teacher-professional-development

Mullis, I., Martin, M., Goh, S., & Cotter (Eds.), K. (2016). *TIMSS 2015 encyclopedia: Education policy and curriculum in mathematics and science.* Boston College, TIMSS & PIRLS International Study Center. http://timssandpirls.bc.edu/timss2015/encyclopedia/

National Institute of Education. (2010). *A Teacher education model for the 21st century (TE21).* National Institute of Education. https://www.nie.edu.sg/docs/default-source/te21_docs/te21_executive-summary_14052010---updated.pdf

Ono, Y., & Ferreira, J. (2010). A case study of continuing teacher professional development through lesson study in South Africa. *South African Journal of Education, 30*(1), 59–74.

Organisation for Economic Co-operation and Development. (2009). *Teaching and learning: An international survey. 2008 technical report.* Organisation for Economic Co-operation and Development. http://www.oecd.org/dataoecd/16/14/44978960.pdf

Organisation for Economic Co-operation and Development. (2019, June). Chapter 5. Providing opportunities for continuous development. In *TALIS 2018 Results: Teachers and School leaders as lifelong learners* (Vol. I). https://www.oecd.org/education/talis-2018-results-volume-i-1d0bc92a-en.htm

Organisation for Economic Co-operation and Development. (2022). *Education GPS*. http://gpseducation.oecd.org

Orr, D., Westbrook, J., Pryor, J., Durrani, N., Sebba, J., & Adu-Yeboah, C. (2013). *What are the impacts and cost effectiveness of strategies to improve performance of untrained and under-trained teachers in the classroom in developing countries? A systemic review.* Australian Aid, The University of Sussex, ePPI Centre, Institute of Education University of London. https://ora.ox.ac.uk/objects/uuid:e6191fc7-f4b1-4f6b-a021-5b9773bdf573/download_file?file_format=pdf&safe_filename=Undertrained_teachers_2013_Orr.pdf

Perry, T., Findon, M., & Cordingley, P. (2021, August). Remote and blended teacher education: A rapid review. *Education Sciences, 11*(8), 453. https://doi.org/10.3390/educsci11080453

Popova, A., Evans, D., & Arancibia, V. (2016). *Training teachers on the jobwhat works and how to measure it. Policy RESEARCH WORKING PAPER 7834, Background paper to the 2018 world development report.* The World Bank Group. http://documents1.worldbank.org/curated/en/122031474915232609/pdf/WPS7834.pdf

Reid, K., & Kleinhenz, E. (2015). *Supporting teacher development: Literature review.* Australian Council for Educational Research.

Schleicher, A. (2012). Building a high-quality teaching profession. Lessons from around the world. *National Research University Higher School of Economics*(1), 74–92. RePEc:nos:voprob:2012:i:1:p:74-92

Schneider, R., & Plasman, K. (2011). Science teacher learning progressions: A review of science teachers' pedagogical content knowledge development. *Review of Educational Research, 81*(4), 530–565.

Shulman, L. (1986, February). Those who understand: Knowledge growth in teaching. *Educational Researcher, 15*(2), 4–14. https://doi.org/10.2307/1175860

Tilak, J. B. (2009). Basic education and development in sub-Saharan Africa. *Journal of International Cooperation in Education, 12*(1), 5–17.

Timperley, H., Wilson, A., Barrar, H., & Fung, I. (2007). *Teacher professional learning and development: Best evidence synthesis iteration.* Ministry of Education. http://www.educationcounts.govt.nz/publications/series/2515/15341

Turner, F., Wilson, E., Ispussinova, S., Kassymbekov, Y., Sharimova, A., Balgynbayeva, B., & Brownhill, S. (2014). Centres of excellence: Systemwide transformation of teaching practice. In D. Bridges (Ed.), *Educational reform and internationalisation: The case of school reform in Kazakhstan* (pp. 83–105). Cambridge University Press.

United Nations Educational, Scientific and Cultural Organization. (2021, January 25). *UNESCO figures show two thirds of an academic year lost on average worldwide due to COVID-19 school closures.* https://en.unesco.org/news/unesco-figures-show-two-thirds-academic-year-lost-average-worldwide-due-covid-19-school

Van den Brande, J., & Zuccullo, J. (2021, July). *The cost of high quality teacher professional development for teachers in England.* Education Policy Institute. https://epi.org.uk/wp-content/uploads/2021/07/2021-Cost-of-quality-teacher-cpd_EPI.pdf

Yoon, K., Duncan, T., Lee, S.-Y., & Shapley, K. (2007). *Reviewing the evidence on how teacher professional development affects student achievement.* U.S. Department of Education, Institute of Educational Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Southwest.

## Section II. Chapter 10

# INSTRUCTION

## Table of Contents

# **Best Practice:** Successful distance learning programs integrate and model a variety of instructional practices.

## 10.1 Overview

As discussed in the previous two chapters, good instruction matters, and it has robust impacts on both student and teacher learning (Bernard et al., 2019; Conn, 2014; Hill et al., 2022; Organisation for Economic Co-operation and Development, 2009; Stockard et al., 2018).

Yet many distance education programs have been characterized as "one step ahead for technology and two steps back for instruction." In particular, early generations of distance learning, such as print, broadcast radio, and television, have tended to be highly didactic. Even newer distance technologies, such as mobile learning and Massive Open Online Courses (MOOCs), have sometimes paid more attention to technology and materials than to the quality of instruction.

Not all instruction across distance education modes is equal—nor can it be. The instructional methods used as part of distance modalities depend on a number of factors: the platform used and whether the course is taught synchronously (in real time) or asynchronously (not in real time). Technology can facilitate and constrain certain types of instruction. For example, it is easier to use a jigsaw approach in applications such as *Zoom* versus in *Moodle*, because of the specific features of Web-conferencing technologies versus learning management systems—but it can be harder to have rich, spontaneous discussions in *Zoom* than in a face-to-face setting.

**Figure 10.1**
**Signature Pedagogies (Shulman, 2005)**

**Surface Structure**

- Concrete operational acts of teaching and learning
- What the learning looks like
- What actually goes on in the classroom

**Deep Structure**

- Assumptions about how best to impart knowledge and expertise
- Decisions about how the material will be taught or presented
- The advantage of choosing certain methods and practices over others

**Implicit Structure**

- The "hidden curriculum" that includes moral dimensions
- Beliefs about professional attitudes, values, and dispositions
- The limit and bounds of learning and application

Instruction in a distance education course is also influenced by the content area. As discussed in Chapter 8, each content has its own repertoire of content-specific pedagogies. But perhaps most fundamentally, instruction is influenced by the way in which teachers are educated to think about, perform, and act in their profession (Shulman, 2005, p. 52). Shulman referred to this acculturation as "signature pedagogies." They represent the beliefs, values, and expectations about what teachers are and do, what learning is and how it occurs, and how teachers teach, the values they hold, and the approaches they use (Shulman, 2005) (See Figure 10.1).

This notion of *signature pedagogies* defines expected practices of teachers, how teachers must in turn instruct their students, and essentially what teaching *is* (Shulman, 2005, p. 53). It is a reminder that instruction is layered and complex, overt yet hidden, a craft and a belief system. Instruction is the product, not just of visible behaviors, but the assumptions, values, and beliefs that drive those behaviors.

This chapter focuses on the importance of instruction in distance education courses for *teachers*. Distance education programs must model for pre- and in-service teachers the same instructional methods that define good teaching and that teachers are expected to use with their students. Programs can do this by integrating a variety of instructional models appropriate to desired learning outcomes. These can include *direct instructional models* (transmission of concepts, skills, and procedures, as in tutoring, for example), *cognitive models* (inductive reasoning, teaching via analogy), and *social models* (learner-centered instruction[1]) discussed in Figure 8.1 (Gaible & Burns, 2007; Maor & Zoriski, 2003; Price et al., 2007; Stockard et al., 2018). As they do this, distance education programs can help teachers explore what "learning" means, their own attitudes toward instruction and learning, and how best to embrace instructional approaches that promise the strongest learning outcomes for their students.

## 10.2 Learner-Centered Instruction

Most instructors are familiar with traditional, or teacher-centered, instruction—lecture, demonstration—a transmission model of learning from a more knowledgeable other to a group of learners. For instructors new to distance education or who have not been prepared to teach in a distance modality, it is often far easier to employ these traditional instructional approaches than to engage learners in "active" or "learner-centered" instructional approaches. Indeed, neither the conceptual foundations of learner-centered instruction nor its trajectory may be clear. For this reason, this chapter focuses on explaining "learner-centered instruction" in detail and contrasting it with "teacher-centered" or "traditional" instruction.

*Teacher-centered instruction* is grounded in a behaviorist conceptual framework of learning characterized by stimulus and response as well as the concept of knowledge transfer. Behaviorally, it is typified by the teacher's control of the pacing and adaptation of instruction. Its dominant manifestation is whole-group teaching and direct instruction. The teacher transmits knowledge about concepts, skills, and procedures via demonstrations, lectures, tutoring, screencasts, or online presentation to students as one large group (Burns, 2021). As Chapter 8 discussed, there is suffcient research that speaks to the effectiveness of quality traditional teacher-centered instruction (especially tutoring).

Variously called "active learning," "student-centered learning," or "child-centered learning," *learner-centered instruction* employs more cognitive and social models of teaching and learning, allowing learners to control the pace of their own learning. It is grounded in a constructivist philosophy of learning in which learners construct knowledge as they are actively involved in meaning-making. It attempts to make learning more exploratory, social, adaptive, and personalized (Burns, 2021). Learner-centered instruction also has a strong body of research highlighting its effectiveness, as noted in Chapter 8. Figure 10.2 (next page) summarizes the main tenets of learner-centered instruction.

[1] Learner-centered instruction is grounded in constructivist learning theory, which has been touched upon throughout this guide and is defined in the Glossary of this guide.

**Figure 10.2**
**Learner-Centered Instruction**

- Learning is a highly personal event—it builds on prior knowledge, is predicated upon a particular individual's interests and experiences and "leverages choice" to build engagement (Parker & Thomsen, 2019, p. 8).
- Learners construct knowledge in a variety of ways, using multiple tools, resources, and experiences (Dimock et al., 2001).
- Learning is developmental and exploratory, providing a variety of teaching and learning opportunities (National Research Council, 2000).
- Learners acquire knowledge by interacting with subject matter that is meaningful and relevant to their own experiences (Boethel & Dimock, 1999).
- Learning is a dynamic, developmental, and cumulative process in which learners assimilate, accommodate, or reject new information according to existing frameworks (Boethel & Dimock, 1999; Dimock et al. 2001).
- Learning is an adaptive experience (Brooks & Brooks, 1993; Conn, 2014).
- Learning has a social dimension: We learn with and from one another (Vygotsky, 1978).
- Learning has affective, behavioral, and cognitive dimensions (Parker & Thomsen, 2019).
- Learners need commensurate amounts of scaffolding, support, practice, and internal and external motivation (Vygotsky, 1978).
- Cognitive and behavioral change that result from learning is a long-term, nonlinear, complex, and cumulative process (Hord et al., 2006).

Learner-centered instruction is not one single pedagogical approach, but rather a family of instructional approaches in which learning goals and content drive how information is organized, understood, presented, and assessed. Figure 10.3 (next page) outlines some of the main instructional approaches that form part of learner-centered instruction

As will be seen in Figure 10.3, while each of the learner-centered methodologies outlined are distinct, they share several intersecting traits, namely:

- The openness of the learning experience, in which learning is driven by the interest of learners themselves.
- Learners generate knowledge through a variety of distinct and differentiated activities
- High degrees of exploration, knowledge generation, teamwork,[2] collaboration and learner agency
- A focus on higher-level thinking and real-world learning experiences
- Connecting the classroom experience to authentic contexts, tools, and resources
- The integration of assessment into the learning activity itself, which, as Chapter 17 will discuss, includes alternative and authentic assessments

Undergirding the above is the centrality of reflection on the instructional methodologies employed in a distance course. By reflecting on the above instructional approaches, teacher-learners can evaluate the utility and value of one instructional approach versus another so they can select and use appropriate learning methodologies to attain defined learning outcomes.

## 10.3 Learner-Centered Instruction in Distance Courses

What does learner-centered instruction look like in a distance-based course for pre-service instruction and in-service teacher professional development (TPD)?

First, learner-centered distance education TPD *courses* are based on learners' needs. They draw on learners' practical, classroom-based experiences in both the design and delivery of the course. In this way, learning is authentic and

[2] Teamwork raises the issue of grouping, which will be addressed in *Chapter 14: Preparing Distance Learners*.

## Figure 10.3
## Types and Characteristics of Learner-Centered Instruction

| Learner-centered approach | Characteristics |
|---|---|
| **Case-based learning** | Case-based learning (CBL) is a methodology that focuses on a real-life situation that practitioners have faced. Though it began as a business-school model at the Harvard Business School, it has expanded into education. It consists of the following:<br>• **The case.** Individuals learn desired educational objectives through interaction with an actual case—a real-world story presented in either narrative, audio, or video format. The case is the unit of study. All essential concepts, facts, and decision-making skills are learned within the context of the case.<br>• **Authenticity.** Cases are context-based, relevant, and realistic.<br>• **Exploration.** Learners are motivated to explore, investigate, and study and work through case problems with their peers.<br>• **A focus on 21st-century skills.** CBL or the "case study method" promotes autonomy, creativity, and problem-solving abilities while simultaneously building hands-on skills needed for success (Harvard Business School, n.d.). |
| **Collaborative learning** | Collaborative learning, sometimes called "cooperative learning," is a joint intellectual effort by learners, typically working in groups of two to five, who search for understanding and solutions or create a joint product. It is grounded in the belief that carefully structured teamwork, providing each student with meaningful roles and responsibilities, can maximize positive peer interactions while minimizing "free riding" (Parker & Thomsen, 2019, p. 8; Burns, 2016b). Characteristics of collaborative learning include the following:<br>• **Positive interdependence.** Team members need one another to complete their task.<br>• **Individual accountability.** Each team member is responsible for a certain part of the task or fulfills a certain role.<br>• **Social negotiation.** Team members must learn to manage conflict and argue constructively.<br>• **Face-to-face interaction.** Team members work together in a common space to complete their task.<br>• **Group processing.** Team members help one another understand how learning occurred (Johnson et al., 1990). |
| **Inquiry-based learning** | In inquiry-based learning (IBL), learners propose and test hypotheses through experimentation and/or the collection of observational data. Characteristics of IBL include the following:<br>• **Orientation/observation.** The instructor introduces a new topic or concept. Learners explore the topic through research, direct instruction, and hands-on activities.<br>• **Questioning/conceptualizing.** Learners develop questions related to the topic.<br>• **Investigation.** This is the lengthiest part of inquiry learning. Learners take the initiative, with appropriate instructor support, to discover answers, to find evidence to support or disprove hypotheses, and to conduct research.<br>• **Active participation.** Learners take ownership of their learning. In so doing, they develop the critical thinking and communication skills necessary for participation in all fields of study<br>• **Conclusion.** Having collected information and data, learners develop conclusions and answers to their questions. They determine if their ideas or hypotheses prove correct or have flaws. This may lead to more questions.<br>• **Discussion and sharing.** All learners can learn from each other at this point by presenting results. The instructors should guide discussions, encouraging debate, more questions, and reflection (Pedaste et al., 2015; Shroat-Lewis & Hage, 2021). |

| Learner-centered approach | Characteristics |
|---|---|
| **Problem-based learning** | Problem-based learning (PBL) began as a medical school model and has since expanded into education. It is generally more rigorous than project-based learning, though there is a great deal of overlap and intersection between the two approaches. Characteristics of PBL are noted here:<br>• **Grounded in a real-world problem situation.** Problems are relevant and contextual. They drive the curriculum. The problems do not test skills; they assist in the development of the skills themselves.<br>• **Ill-structured.**[3] There is not one solution, but multiple solutions. This allows for free inquiry. As new information is gathered in a reiterative process, the perception of the problem, and thus the solution, changes.<br>• **Interdisciplinary.** Because it's authentic, the PBL activity cuts across disciplines.<br>• **Use of real-world tools and resources.** Learners use technology, primary source data, and experts to solve the problem.<br>• **Self-directed learning.** Learners must be independent and make their own decisions based on availability of evidence.<br>• **Collaboration.** Collaboration is essential. Learners work together in a team to solve a problem.<br>• **A wide range of assessment strategies.** Strategies may include formative, summative, individual, peer-based, and assessment by experts (Savery, 2006; University of Delaware, n.d.). |
| **Project-oriented learning**[4] | Project-oriented (POL) or project-based learning is an instructional method in which learners gain knowledge and skills by working for an extended period of time to investigate and respond to an authentic, engaging, and complex question or challenge. It involves the following:<br>• **Essential question.** The project is framed by an essential question—an open-ended, overarching question to answer, at the appropriate level of challenge. Unlike PBL where the problem is *always* real, in POL, the project or issue may be simulated and thus not always real.<br>• **Sustained inquiry.** Learners engage in a rigorous, extended process of posing questions, finding resources, and applying information.<br>• **Authenticity.** The project should involve a real-world context, tasks, tools, quality standards or speak to personal concerns, interests, and issues in the learners' lives.<br>• **Learner voice and choice.** Learners make some decisions about the project, including how they work and what they create, and express their own ideas in their own voice.<br>• **Reflection.** Learners and instructors reflect on the learning, the effectiveness of their inquiry and project activities, the quality of student work, and obstacles that arose and strategies for overcoming them.<br>• **Critique and revision.** Learners give, receive, and apply feedback to improve their process and products (Buck Institute for Education, n.d.). |

[3] "Well-structured" content is learned in an orderly, sequential fashion so that learners demonstrate mastery of a concept. "Ill-structured" content requires learners to understand complex interactions among several concepts and demands that learners find additional information and draw their own conclusions, demonstrating evidence to support such conclusions.

[4] Project- and problem-based learning are often erroneously conflated (see, for example, Latchem & Jung, 2010, p. 102), in no small measure because they share the same acronym—PBL. However, they are two different instructional methods. Some educational institutions, such as México's Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM), have retitled project-based learning as "project-oriented learning" (POL) to differentiate it from problem-based learning. That acronym is used in this guide.

relevant so that teacher-learners can improve their classroom competence. Learner-centered distance education courses incorporate school-based activities that build on and add to teacher-learners' repertoire of knowledge and skills. Technology and organized activities and assignments provide multiple routes for communicating, understanding, presenting, and assessing knowledge.

Next, *instructors* in learner-centered TPD education courses embody a number of tacit and explicit behaviors. They communicate high expectations; elicit learners' prior knowledge; encourage contact between learner and instructor; facilitate and support both individual and collaborative learning; encourage active learning and sharing of beliefs and opinions; foster reciprocity and cooperation among learners; respect and model diverse talents and ways of learning; provide feedback; and assess performance, progress, and the learning product (Chickering & Gamson, 1987; Commonwealth of Learning, 2008; Dawson & Dana, 2018; Reupert et al., 2009).

Third, *courses* are deliberately designed so that they capitalize on the features of the particular distance mode to support more learner-centered instruction. For example, IAI can incorporate classroom-based games, group work, and songs. The breakout room feature of Web-conferencing tools allows instructors to organize learners into small groups, where they can come to consensus on a decision, collaborate on a shared document, or do a Fishbowl activity. As they would in an in-person classroom, online instructors can virtually drop in and out of breakout rooms to monitor progress and check for understanding; create virtual Carousel Walks, where learners view each other's creations (via Google *Slides*, for example); and use the polling features of the webinar platform to check for student understanding (Burns, 2020b).

More importantly, all of the learner-centered methodologies discussed in Figure 10.3, as well as the research-based instructional practices of

**Figure 10.4**
**Research-Proven Instructional Strategies All Teachers Should Know**

Rosenshine (2012) advocates for the following 10 instructional practices based on research on cognitive science, mastery teachers, and cognitive supports:

1. **Elicit prior knowledge:** Begin a lesson with a short review of prior knowledge.
2. **Chunk information:** Present new material in small steps/chunks of information, with practice after each step ("retrieval practice").
3. **Use questions:** Ask many diverse types of questions and check learner responses.
4. **Use models:** Provide learners with models and examples to help them solve problems more quickly.
5. **Provide guidance:** Guide learner practice of new material.
6. **Formatively assess:** Check for learner understanding at each point in the lesson.
7. **Focus on mastery learning:** Focus on mastery learning and higher test success rates (See Chapter 17 for more information on mastery learning).
8. **Provide scaffolds:** Provide learners with supports, hints, guiding questions and tips for difficult tasks. Consider "backward chaining"—a scaffold where an instructor may give learners the answer but have them work backwards to figure it out or do the "easy stuff" for learners so they can concentrate on harder aspects of the problem (Meehan, 2022).
9. **Time for application:** Ensure and monitor independent practice.
10. **Review:** Engage learners in weekly and monthly review (Rosenshine, 2012, pp. 12–19).

Figure 10.4, can be employed in distance-based courses.

Particularly since the emergency remote teaching of the COVID-19 pandemic school lockdowns, instructors are using more interactive instructional methodologies with positive results, whether they term them "learner-centered" or not. For example, flipped learning, which was discussed in Chapter 5—prerecording lectures and making them available via video, audio, or text so that they can instead use class time to apply, analyze, and synthesize what has been learned—has become a staple in secondary and university-level blended courses.

Finally, *learners* in "active" or "learner-centered" distance education courses are invested in the process of learning and have a sense of ownership of their own learning. They question, collaborate, investigate, apply, and evaluate what they have learned. They recognize that they are members of a technology-based (and possibly face-based) community, and interact with tools, peers, materials, instructors, and experiences to fuel the online sharing and collaboration that in turn fuels learning. They use higher-order thinking skills to determine the quality, authenticity, and applicability of the tools, materials, and resources with which they are interacting (Burns, 2020a; Commonwealth of Learning, 2008). The role of distance learners and how to support them as individuals and as learners and how to assess their learning, is examined in depth in Chapters 14–17.

## 10.4 Conclusion

Employing a variety of instructional strategies has been demonstrated to have a strong differential impact on learning for children, adolescents, and adult learners (Conn, 2014; DiPietro et al., 2010; Katsarou & Chatzipanagiotou, 2021). Thus, distance instructors should apply research-proven instructional methods appropriate for the learning task at hand and integrate and model *high-quality* instructional skills, whether learner-centered or teacher-centered. If the role of any teacher professional educational experience is to help them develop "signature pedagogies—responsible practices in the service of others," then distance instructors must examine their own assumptions about what learning is and how it occurs; which instructional methods lead to certain learning outcomes; and what selection, sequencing, and organization of inputs make learning happen, as well as help their teacher-learners do the same (Shulman, 2005, p. 52). This speaks to careful attention to the learning methodologies employed in a distance course and the importance of constant reflection on these methodologies.

Fortunately, the behaviors identified as "high quality" in distance teacher professional development instruction are similar—although not always identical—to those in face-to-face instruction (Blitz, 2013; Burns, 2016a; DiPietro et al., 2010, p. 10). As Chapters 11 and 13 discuss, distance education programs can design courses that model a variety of instructional approaches, and distance instructors can be prepared in the same instructional methods they are expected to utilize in their own teaching.

The topics discussed in these past three chapters—understanding the qualities that define good teaching, high-quality professional development, and instruction within a distance learning program—are among the most critical components of a quality distance-learning experience. Together, these elements can help to develop the high-quality teachers so essential for students' academic success. For distance programs to help teachers create their own repertoire of effective instructional methods, there must be strong alignment and articulation between understanding the qualities that influence good teaching, high-quality teacher professional development, and high-quality instructional activities. All of this is shaped by and embedded in quality instructional design, the focus of the next chapter.

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## References

Bernard, R. M., Borokhovski, E., Schmid, R., Waddington, D. I., & Pickup, D. I. (2019). Twenty-first century adaptive teaching and individualized learning operationalized as specific blends of student-centered instructional events: A systematic review and meta-analysis. *Campbell Systematic Review*. doi:10.1002/cl2.1017

Blitz, C. (2013). *Can online learning communities achieve the goals of traditional professional learning communities? What the literature says (REL 2013–003).* U.S. Department of Education, Institute of Education Sciences, National Center for Educational Evaluation and Regional Assistance, Regional Educational Laboratory Mid-Atlantic. http://ies.ed.gov/ncee/edlabs

Boethel, M., & Dimock, K. (1999). *Constructing knowledge with technology: An overview of the literature.* Southwest Educational Development Laboratory.

Brooks, J., & Brooks,, M. (1993). *The case for constructivist classrooms.* Association for Supervision and Curriculum Development.

Buck Institute for Education. (n.d.). *What is PBL?* Buck Institute for Education. https://www.pblworks.org/what-is-pbl

Burns, M. (2016a). Ignoradas y subutilizadas: Estrategias para incrementar la retención en programas en línea. In G. Kelchtermans, *Formación de formadores y educación de calidad como generadora de cambio* (pp. 115-138). Katholieke Universiteit Leuven and Universidad Nacional de Educación de Ecuador.

Burns, M. (2016b, November 22). *Five strategies to deepen student collaboration.* Edutopia. https://www.edutopia.org/article/5-strategies-deepen-student-collaboration-mary-burns

Burns, M. (2020a, June 10). *Online education's COVID-19 Struggles*. UKFIET-The Education and Development Forum. https://www.ukfiet.org/2020/online-educations-covid-19-struggles/

Burns, M. (2020b, July 22). *Getting started with teaching online…again.* K-12 Talk. https://k-12talk.com/2020/07/22/getting-started-with-teaching-onlineagain/

Burns, M. (2021). *Background paper prepared for the 2023 Global education monitoring report, Technology and education: Technology in education.* United Nations Educational, Scientific and Cultural Organization. https://unesdoc.unesco.org/ark:/48223/pf0000378951

Chickering, A., & Gamson, Z. (1987). Seven principles for good practice in undergraduate education. *American Association for Higher Education (AAHE) Bulletin*, *3*(7), 2–6. https://files.eric.ed.gov/fulltext/ED282491.pdf

Commonwealth of Learning. (2008). *Education for a digital world: Advice, guidelines and effective practice from around the globe.* http://oasis.col.org/handle/11599/52

Conn, K. (2014). *Identifying effective education interventions in sub-Saharan Africa: A meta-analysis of rigorous impact evaluations* [Doctoral dissertation, Columbia University].

Dawson, K., & Dana, N. (2018). Professional Development for K-12 Online Teachers. In K. Kennedy, & R. Ferdig (Eds.), *Handbook of research of K12 online and blended learning* (pp. 247–260). Carnegie Mellon University: ETC Press.

Dimock, K. V., Burns, M., Heath, M., & Burniske, J. (2001, December). *Applying technology to restructuring learning: How teachers use computers in technology assisted constructivist learning environments.* Southwest Educational Development Laboratory.

DiPietro, M., Ferdig, R., Black, E., & Presto, M. (2010, Spring). Best practices in teaching K-12 online: Lessons learned from Michigan Virtual School teachers. *Journal of Interactive Online Learning*, *9*(3), 10–35. https://www.learntechlib.org/p/109394/

Gaible, E., & Burns, M. (2007). *Using technology to train teachers: Appropriate uses of ICT for teacher professional development in developing countries.* InfoDev | World Bank. https://documents1.worldbank.org/curated/en/900291468324835987/pdf/396180infoDev01IN0TEACHERS01PUBLIC1.pdf

Harvard Business School. (n.d.). *What is the case study method?* Harvard Business School. https://www.exed.hbs.edu/hbs-experience/learning-experience/case-study-method

Hill, H., Papay, J., & Schwartz, N. (2022). *Dispelling the myths: What the research says about teacher professional learning.* The Research Partnership for Professional Learning. Annenberg Institute for School Reform at Brown University.

Hord, S., Rutherford, W. L., Huling-Austin, L., & Hall, G. (2006). *Taking charge of change.* Southwest Educational Development Laboratory.

Johnson, D., Johnson, R., & Holubec, E. (1990). *Cooperation in the classroom.*Interaction Book Company.

Katsarou, E., & Chatzipanagiotou, P. (2021). A critical review of selected literature on learner-centered interactions in online learning. *Electronic Journal of e-Learning*, *19*(5), 349–362. https://files.eric.ed.gov/fulltext/EJ1328843.pdf

Latchem, C., & Jung, I. (2010). *Distance and blended learning in Asia.* Routledge.

Maor, D., & Zariski, A. (2003). Is there a fit between pedagogy and technology in online learning? *Proceedings of the 12th Annual Teaching Learning Forum.* Partners in Learning, Edith Cowan University. https://researchrepository.murdoch.edu.au/id/eprint/8687/1/Is_there_a_fit_between_pedagogy.pdf

Meehan, M. (2022, June 20). How to use backward chaining to differentiate instruction (J. Gonzalez, Interviewer). https://www.cultofpedagogy.com/backward-chaining/

National Research Council. (2000). *How people learn: Brain, mind, experience and school.* National Academies Press.

Organisation for Economic Co-operation and Development. (2009). *Teaching and learning: An international survey. 2008 technical report.* http://www.oecd.org/dataoecd/16/14/44978960.pdf

Parker, R., & Thomsen, B. (2019). *Learning through play at school: A study of playful integrated pedagogies that foster children's holistic skills development in the primary school classroom.* Australian Council for Educational Research (ACER) eSearch. https://research.acer.edu.au/learning_processes/22

Pedaste, M., Mäeots, M., Siiman, L., De Jong, T., Van Riesen, S., Kamp, E., . . . Tsourlidaki, E. (2015, February). Phases of inquiry-based learning: Definitions and the inquiry cycle. *Educational Research Review, 14*, 47–61. https://doi.org/10.1016/j.edurev.2015.02.003

Price, L., Richardson, J., & Jelfs, A. (2007). Face-to-face versus online tutoring support in distance education. *Studies in higher education, 32*(1), 1–20. https://doi.org/10.1080/03075070601004366

Reupert, A., Maybery, D., Patrick, K., & Chittleborough, P. (2009). The importance of being human: Instructors' personal presence in distance programs. *International Journal of Teaching and Learning in Higher Education, 21*(1), 47–56. http://www.isetl.org/ijtlhe/

Rosenshine, B. (2012). Principles of instruction: Research-based strategies that all teachers should know. *American Educator, 36*(1), 12–39. https://files.eric.ed.gov/fulltext/EJ971753.pdf

Savery, J. (2006). Overview of problem-based learning: Definitions and distinctions. *Interdisciplinary Journal of Problem-Based Learning, 1*(1), 9–20. http://docs.lib.purdue.edu/ijpbl/

Shroat-Lewis, R., & Hage, M. (2021). Engaging students at all academic levels in an inquiry-based paleoecologic learning activity—Even when you don't have the rocks. *Journal of College Science Teaching, 51*(2). https://www.nsta.org/journal-college-science-teaching/journal-college-science-teaching-novemberdecember-2021/engaging

Shulman, L. (2005). Signature pedagogies in the professions. *Deadalus, 134*(3), 52–59. https://www.jstor.org/stable/20027998#metadata_info_tab_contents

Stockard, J., Wood, T. W., Coughlin, C., & Khoury, C. R. (2018). The effectiveness of direct instruction curricula: A meta-analysis of a half century of research. *Review of Educational Research, 88*(4), 479–507. doi:10.3102/0034654317751919

University of Delaware. (n.d.). *Problem based learning*. Institute for Transforming University Education (ITUE) Problem Based Learning Clearinghouse. https://www.itue.udel.edu/pbl/

Vygotsky, L. (1978). *Mind in society.* Harvard University Press.

Section II. Chapter 11

# INSTRUCTIONAL DESIGN

## Table of Contents

**Best Practice:** Distance education programs must pay careful attention to instructional design.

## 11.1 Overview

The good teaching, good instruction, and high-quality professional development discussed in the previous three chapters are contingent upon strong design of learning experiences or instructional design. Well-designed distance courses grounded in specific and measurable learning outcomes can increase teachers' knowledge in a particular domain, help them master content-specific pedagogical approaches, and develop practical skills such as questioning techniques (Moon et al., 2005). Poorly designed technology-based courses can confound learning, frustrate learners and instructors, and result in high attrition rates (Costley & Lange, 2017).

This chapter focuses on *instructional design* to support quality teaching and learning in distance education programs. *Instructional design* is a broad term that encompasses the selection, organization, sequencing, and assessment of content, as well as the materials and tools and the design and sequencing of experiences required to help learners attain a certain set of learning outcomes. Instructional design as a discipline emerged from the challenge of designing learning experiences with and through technology and is thus indispensable in a distance learning situation. This is particularly the case in asynchronous learning experiences, such as self-paced online courses or self-study print guides, where essentially all learning is connected to the quality of materials and the design and sequencing of activities.

The literature on best practices in instructional design is vast. This chapter presents in fuller detail the most salient themes regarding good instructional design for distance education courses. Some of the considerations noted here obviously pertain to some modes of distance education more than others. Where that is the case, they will be noted. For instance, Figure 11.1 provides examples of international standards for *online* course and program design.

While this chapter focuses on instructional design, the next chapter focuses on content and materials which obviously plays a central role in instructional design. Thus, these two chapters are companion chapters and should be read together.

## 11.2 Getting Started with Course Design: People, Approaches, Tools, and Processes

Teachers engage in instructional design all the time—in unit and lesson planning and in creating fun, engaging activities for learners. But technology adds layers of complexity to the instructional design process. Thus, the term "instructional design" often refers to designing learning experiences mediated through technology. But it is not a foreign concept to anyone who has designed non-technology based learning activities. As with in-person course design it is a multi-stage and integrated undertaking that focuses on the learner, learning, instruction, content, communication, and assessment—but, in the case of distance education, all mediated through technology.

**Figure 11.1**
**Standards and Frameworks for Online Course Design**

Chapter 9 focuses on best practices and standards for professional development in general. Online learning is a particularly challenging form of education and professional learning because the learner's experience is almost entirely mediated through some form of technology.

The standards below focus on quality online course design. They are by no means the only online learning standards to which one can refer—many universities, for example, have their own standards. They are, however, internationally recognized and validated standards governing the design of online and blended learning experiences:

- The Association for Educational Communications and Technology Instructional Design Standards for Distance Learning are primarily geared toward universities but relevant for all distance education entities.
- The Australasian Council on Open, Distance and eLearning *(ACODE)* Threshold Standards for Online Learning Environments focus on developing course sites to ensure a level of consistency and quality in teaching environments.
- Quality Matters: Course Design Rubric Standards are intended for use with courses that are delivered fully online or have a significant online component.
- The National Standards for Quality Online Courses provide standards and guidelines for online courses.
- National Standards for Quality Online Programs outline standards and guidelines for online programs.
- The World Wide Web Consortium's (W3) standards are the technical specifications, protocols, and guidelines, including for accessibility, that drive the World Wide Web.

Each mode of distance education—interactive audio instruction (IAI) or print-based correspondence courses—will have learning products that are designed differently.
Yet designing all forms of distance education courses share commonalities. They typically require multiple phases (audience research; planning; production; delivery; evaluation) and involve an instructional design team, an approach, a set of tools, and a design process. All of these components will vary based on the type of distance modality used and the size, scope, and budget of a distance education program, and they are discussed here.

### 11.2.1 Instructional Design Team

Distance education programs should be developed by experienced and qualified instructional design teams. This is a team with expertise in managing, designing, and producing distance education courses. It includes some variation of the following roles:

- **Project manager.** The project manager is the person who oversees all aspects of the course or program.
- **Subject matter expert (SME).** The SME is the content expert—in math, reading instruction, formative assessment—whatever the focus of the course may be. This person designs course content, activities, materials, and assessments, and focuses on sequencing, integration, and pacing to create a unified course. He/she may not be a technology expert or even know much about technology, thus will work closely with the instructional designer.
- **Instructional designer.** The instructional design expert collaborates with the SME and with the technical team. The definition of an instructional designer is somewhat variable. Often, he or she may be the person who takes the SME's ideas and content and creates eLearning or mobile-based activities using a particular software. In this scenario, the instructional designer functions as an eLearning specialist.

  Or the instructional designer may serve as an intermediary—"translating" between the content requirements and technical aspects of a course, and often collaborating with the technical team to support them in creating a meaningful digital learning experience based on intended outcomes or activities.

Whatever role an instructional designer assumes, he or she should be highly fluent in teaching and learning, understand good design, and comprehend the affordances of particular technologies and how they promote certain types of learning.

- Technical team. This team can include any one or a combination of the following: a Web developer, graphic designer, video and audio production specialist, eLearning specialist, and/or a programmer.
- Other staff. For example, scenarios, animations, stories, audio, radio programs, or podcasts may require voice actors as narrators or to play the roles of teachers or learners. Visually based distance education and certain multimedia and online activities may need actors—people to play the role of an educator, student, or parent, particularly if design teams cannot get access to an actual classroom or when working in contexts where privacy protections are strict.

Specifically, in terms of *radio* and *television* programming, development teams will include curriculum experts, SMEs, audio and video production specialists, scriptwriters, materials developers, and voice and video actors (Richmond et al., 2021). For *print-based* learning, content development teams may include translators, script writers, general writers, a design specialist for layout and graphics, and a copy editor.

While the instructional design team outlined above is the preferred means of designing distance courses, the reality is that many distance programs are low-budget. Thus, the development team may only consist of the online instructor designing his or her own course *and* course content with some technical support.

### 11.2.2 Instructional Design Approaches

Typically, instructional designers use an approach or framework to guide the design of the entire program or individual courses. There are numerous instructional design approaches or paths for designing instruction, and each program will select the one approach or the combination of approaches that best fits its scope, budget, and philosophy. An instructional design (ID) approach is *not* a set of technical specifications; rather, as its name suggests, it guides or frames how technology-mediated instruction will occur. Instructional design frameworks can be used alone or in combination with another instructional design framework (for example ADDIE with Understanding by Design).

Figure 11.2 notes some well-known instructional design approaches, including two approaches—the 5Es and Understanding by Design (UbD)—that are focused on designing in-class lessons or learning units but that also have been successfully adapted for distance contexts. While the majority of ID approaches are  specifically for online learning, they are germane to other forms of distance education and in some cases, in-person learning.

Whatever instructional design approach a distance education program chooses to use, it is important to ground this design framework in the experience of users (i.e., learners). User experience (UX) design is an umbrella term that exhorts instructional designers to focus on the needs and experiences of users—in particular, how users feel during the learning activity and their overall learning experience. UX designers then apply this knowledge to the development of a course or program in order to ensure that the user has the best possible experience (Interaction Design Foundation, n.d.). Piloting, which will be discussed at the end of this chapter, is an important ingredient in UX design.

### 11.2.3 Course Design Phases and Tools

Each mode of distance learning will require mode-specific technologies (audio recording

**Figure 11.2**
**Instructional Design Approaches**

| Approach | Characteristics |
|---|---|
| **ADDIE (Analyze, Design, Develop, Implement, Evaluate)** | ADDIE was developed in the 1970s by Florida State University for the U.S. military (Molenda, 2015). It is intended to be a linear framework, although it is often used as a continuous cycle, and consists of the following five phases:<br>• **A: Analysis.** At the analysis stage, the design team assesses the needs and goals of future learners. This allows for an educational experience that is relevant and personalized.<br>• **D: Design.** This design phase is a planning phase. The instructional design team maps out the "big pieces" of the course itself—setting up the learning management system (LMS), wireframing the course, developing a syllabus, identifying actors, identifying the instructional approach of the course, outlining learning objectives, or all of these.<br>• **D: Develop.** In this phase, subject matter experts and instructional designers develop educational materials and learning experiences—text, video, audio, recordings, presentations, and animations. They create scenarios, stories, assignments, project-based activities, discussion questions, and tests, and organize how teaching and learning are sequenced. This is the most extensive and time-consuming phase of ADDIE. Content is added to the LMS or burned onto DVDs, or print-based packets are produced.<br>• **I: Implement.** The online course, mobile course, or audio program is launched with learners, ideally as a pilot or a beta test to identify problems, eliminate bugs, and correct mistakes. Often, however, distance learning experiences may be launched as full-blown courses or programs with no beta or pilot testing.<br>• **E: Evaluate.** This phase involves both formative evaluation and summative evaluation. Although the original ADDIE framework terminates here, ADDIE is better considered a cycle, with data used to revise the course. |
| **SAM (Successive Approximation Model)** | Developed by Michael Allen of Allen Interactions, the Successive Approximation Model (SAM) is a simplified version of the ADDIE model, designed specifically to elicit feedback and build working models earlier in the instructional design process. It uses a recursive, versus a linear, process for course development and consists of three phases:<br>1. **Preparation phase.** This is a quick phase in which the design team gathers information about the intended audience.<br>2. **Iterative design phase.** This phase is characterized by the "Savvy Start"—the initial collaborative brainstorming meeting that establishes the foundation for a successful course. It focuses primarily on performance and serves as the starting point for team members to converse about course design.<br>3. **Iterative development phase.** Like the previous phase, in the Iterative Development Phase the design team rotates through development, implementation, and evaluation. As the course continues to be developed, design team members continually analyze and evaluate, so that at any point if a change needs to occur, it can happen quickly and limit budget or time risks (Allen Interactions, 2022). |

| Approach | Characteristics |
|---|---|
| **Rapid Prototyping** | Rapid Prototyping also builds on the ADDIE model, combining the design, development, and evaluation phases. It is a nonlinear approach, with three phases that are part of a continuous review and revision cycle:<br>1. **Prototype.** Course authors produce a **sample** working model that is a scaled-down representative version of the whole course.<br>2. **Review.** A particular instructional module is tested with learners to see how learners respond to content, instructional strategies, and activities, and to determine how well the technology serves as a conduit for each.<br>3. **Refine.** Learners provide feedback, designers make fixes, and learners test the prototype again. This process should continue until there is confirmation of the final product (Shift eLearning, n.d.). |
| **5E Model[1] (Engage, Explore, Explain, Elaborate, Evaluate)** | The 5E model is used for face-to-face, blended, and online learning, particularly for the design of HyperDocs. It was developed in 1987 by the Biological Sciences Curriculum Study and involves the following five phases (quoted from Bybee et. al, 2006):<br>1. **Engage.** The instructor or a curriculum task assesses the learners' prior knowledge and helps them become engaged in a new concept through the use of short activities that promote curiosity and elicit prior knowledge. The activity should make connections between past and present learning experiences, expose prior conceptions, and organize learners' thinking toward the learning outcomes of current activities.<br>2. **Explore.** The instructor or a curriculum task provides learners with a common base of activities within which current concepts (i.e., misconceptions), processes, and skills are identified. Learners may complete activities that help them use prior knowledge to generate new ideas, explore questions and possibilities, and design and conduct a preliminary investigation.<br>3. **Explain.** This phase focuses learners' attention on a particular aspect of their engagement and exploration experiences and provides opportunities to demonstrate their conceptual understanding, process skills, or behaviors. It provides opportunities for instructors to directly introduce a concept, process, or skill. Learners explain their understanding of the concept. An explanation from the instructor or the curriculum may guide learners toward a deeper understanding, which is a critical part of this phase.<br>4. **Elaborate.** Instructors challenge and extend learners' conceptual understanding and skills. Through new experiences, learners develop deeper and broader understanding, more information, and adequate skills, and apply their understanding of the concept by conducting additional activities.<br>5. **Evaluate.** The evaluation phase encourages learners to assess their understanding and abilities and provides opportunities for instructors to evaluate learners' progress toward achieving the educational objectives (Bybee et al., 2006, p. 92). |

[1] There is a second, unrelated 5E model that assesses learners' experiences and is discussed in *Chapter 19: Assuring Quality*.

| Approach | Characteristics |
|---|---|
| **Gagné's 9 Step Instructional Design Process** | Developed in the 1960s, this is a long-established and highly regarded instructional design framework commonly used both in face-to-face and distance learning. The design process involves the following 9 self-explanatory steps:<br>**1.** Gain the student's attention.<br>**2.** Inform learners of objectives.<br>**3.** Stimulate recall of prior knowledge.<br>**4.** Present the content.<br>**5.** Provide learning guidance.<br>**6.** Elicit performance.<br>**7.** Provide feedback.<br>**8.** Assess performance.<br>**9.** Enhance retention and transfer (Gagné & Briggs, 1974). |
| **Understanding by Design (UbD)** | Traditionally, instructional design has followed a *content*-focused rather than a *results*-focused design. Understanding by Design (UbD) was developed by Wiggins & McTighe (2005) as a framework for learning that focuses on attaining learning goals. Central to UbD is "backward design," a three-stage instructional design process that guides teachers in lesson or activity planning by beginning with the desired end result and designing "backwards" from this goal. Backward design is sequenced as follows:<br>• **Identify the desired results or goals.** What should learners know or be able to do as a result of this learning experience?<br>• **Determine acceptable evidence.** How will instructors know that learners have achieved desired results? What kind of formative and summative assessment should be built into the activity?<br>• **Plan learning experiences and instruction.** What exactly will instructors need to teach? How should learners be grouped? How much time should activities take? What activities will best help learners meet learning goals? What materials and resources will learners need? How much should be lecture? How much should be self-discovery on the parts of learners?<br>UbD is not a distance-based instructional design strategy *per se*, but rather a curriculum or course-planning framework that can be used in all distance modalities either as a stand-alone approach or as part of the instructional design frameworks mentioned above. |

equipment) as well as general technology tools (computers, word processing software). Space limitations inhibit a detailed discussion of each technology tool required for designing in each distance education mode. This section instead discusses four sets of technology tools that correspond to the development phases for *online, blended,* and *mobile learning* experiences.

### Constructing the course structure: Wireframing tools

In developing distance courses, design teams often initiate the development process with wireframing. Wireframing is a way to establish the structure of the course and to lay out content, functionality, and navigation of the course before visual design and content are added. Designers may use wireframe tools, such as *UXPin*. Chart paper and sticky notes also can suffice.

### Building course content, scope, and sequence: Storyboarding tools

Storyboarding is often the second step in online course design. While wireframes focus on structure, storyboarding focuses on content and on constructing a course narrative and is thus more information-rich than a wireframe. It involves visually mapping and sequencing the elements of a story, content topics, learning activities, or module. Storyboards can range in detail from rough stick figures, text and arrows showing actions, and sequence and flow to actual completed scripts, actions, notes, and finished visual elements. Whatever the product, storyboarding should include learning outcomes and ideas for assessing learning.

Distance programs can use dedicated storyboarding tools, such as *Moqups*, *Storyboarder, Storyboard That*; concept mapping tools like *Mural, MindMup, Visio*, or *Coggle*; simple tools such as Google *Docs* or *PowerPoint*; or the many free storyboarding templates that can be found online. And of course, distance programs can and do use pencil and paper for storyboarding.

### Creating eLearning content and modules: eLearning authoring tools

eLearning authoring tools are software applications that design teams use to create multimedia-based eLearning content and modules. Such applications typically have a suite of tools that allow designers to create video, audio, animations, and assessments and they allow access to "digital assets," such as vector graphics,[2] digital images, or some video. Instructional designers can then combine this content into a structured learning sequence—a game, presentation, or interactive story that can be part of a *module*—a self-contained, multichannel unit of study. Modules can be mini-courses (mini-modules for microlearning), one component of a full course in a learning management system (LMS) or a learning experiences available via apps that can be accessed using tablets or phones, often offline. Some of the best-known eLearning authoring tools are commercial or "enterprise" tools—*Articulate 360, Lectora*, *Elucidat*, or *WeVideo*—and open-source *H5P*.

There are numerous reasons to use eLearning authoring tools. First, they tend to come with existing templates, which for novice instructional designers can make module design easier and faster and make the modules themselves more attractive and engaging than would otherwise be the case. Many *commercial* vendors have robust and highly responsive technical support and offer free continuing education in instructional design as part of the license fee. Many are full-suite, offering copyright-free digital assets, development tools, and, in some cases, their own version of an LMS where course designers can create and launch an asynchronous online course. Almost all eLearning authoring tools are SCORM and .xAPI compliant, allowing designers to easily export eLearning content into *Moodle* or *Canvas*, and many have strong accessibility features (to be discussed). Finally, designers can create their own modules and save them as templates or lesson frames for reuse for other courses. For commercial or enterprise eLearning applications, this all comes at what is often a high annual licensing cost. For open-source applications, which are often—but not always—free, this is often accompanied by steeper learning curves, a reliance on technical documentation, and the larger volunteer community for support.[3]

[2] Visit @virinaflora on Instagram for examples of vector drawings.

[3] There are service providers who support many open source tools for a fee. Most well-known are so called *Moodle* support providers such as *Moodlerooms*.

A particularly useful and free open-source tool that helps with wireframing, storyboarding, and developing eLearning content is *Twine. Twine* allows users to build stories, games, plans, and branching scenarios. Branching scenarios are what they sound like: A learner is presented with a scenario followed by a question or decision point that typically offers several responses or choices. The learner's choice creates several more options or branches that represent consequences of or additional questions based on those choices. Thus, branching scenarios unfold in non-linear and unpredictable ways. Branching is often used for multiple-choice quizzes, but in ways that dilute their potential richness. Where branching scenarios are particularly helpful is in showing learners the complexity of a situation; displaying multiple perspectives for an ill-structured problem or dilemma; or facilitating learners' careful consideration of the best-informed choice when there is not one right answer to a situation.

#### Course platform or distribution channel

Once course content is developed, it can be loaded into an LMS. LMSs, it should be noted, typically support HTML and XML and may—this is not a given—come with their own eLearning authoring tools, thus lessening the need for the eLearning authoring software mentioned above. Once content is developed and uploaded to the LMS, MOOC, or webinar platform, the course can be created and sequenced within the platform (i.e., organized by sessions, modules, or weeks) and directions and links to materials added, among other tasks. The platform makes it possible to register learners and launch the course and, in the case of most LMS and MOOC platforms, grade learners and generate reports.

### 11.2.4 Designing for Audio-Based and Visually Based Distance Education

The above course design phases are particular to online technologies, mobile technologies, and multimedia-based learning. Designing for IAI, radio lessons and broadcasts, and television will involve a different design process. Christina & Louge (2015) outline the design process for IAI, discussed in Chapter 2, as follows:

- **Preparation.** This phase introduces IAI to a context and provides initial engagement with stakeholders. It involves audience research, analysis of the educational context, assessment of technology options and production resources, and program design. The end product of this Phase 1 is a program design document.
- **Development.** Phase 2 involves scriptwriter training; scriptwriting; production of draft audio episode; and formative evaluation that prepares for the final production of user-ready episodes and supporting materials.
- **Production.** Phase 3 involves final production and post-production of audio episodes and preparation of supplementary learning materials for the program.
- **Delivery.** Phase 4 involves training teachers/caregivers in the use of IAI; mobilizing the host community; and delivering the program via radio, TV, MP3, mobile phone, or other technology (Christina & Louge, 2015, p. 5).

## 11.3 Distance Education Course Design Principles

Distance education for teachers is professional development. Like in-person professional development, it must be guided by the same standards and evidence-based best practices discussed in Chapter 9.

While technology is integral to distance learning, it cannot transform a poorly designed distance course into an excellent one. For that to occur, effective distance courses must be grounded in a series of design principles, discussed below.

### 11.3.1 Design for Quality Teaching and Learning

Many instructional design teams may spend more time on engagement versus learning and on the entertainment versus the instructional characteristics of a course. While engagement is critical to learning, it is not the end state of a distance-learning experience—improved learning is. Thus, as it is in face-to-face learning, the North Star of distance education should be creating the most optimal teaching and learning experiences possible.

A high-quality distance learning experience must take into account multiple factors: the characteristics of targeted learners, the nature of the content, integration of ongoing feedback, and assessment. Designing such an environment requires the following:

- Development of specific measurable learning outcomes and clear learning expectations
- Connections between the learner's prior knowledge and course content
- Ample opportunities for practice and expert feedback to guide the development of knowledge in action (National Research Council, 2000)
- Learning activities that involve a variety of methods and approaches for both group and individual work and that are active and experiential to help learners construct meaning
- Learning experiences that are contextualized within a real situation and embedded in real communities of peers and experts
- Linking assessment to learning outcomes or performance standards *and* allowing learners to demonstrate their understanding through real-world applications; in particular, assessment should include self-assessment, and in synchronous courses, peer assessment
- Providing learners with opportunities for trial and error, reflection, and revision, and offering ongoing, timely feedback

### 11.3.2 Design for Adult Learning

Research demonstrates that adult learners share common characteristics and beliefs that must be integrated into any learning experience (McAleavy et al., 2018).

- They must be treated with respect and recognition and have their professional experiences integrated into workshops and discussions.
- They are practical and want solutions they can implement to address real-life challenges.
- They are self-directed and have to be given the opportunity to reflect on and analyze their own practice.
- They have to process information as part of learning.
- They have varied learning styles.
- They require the support of peers (Knowles, 1975).

Thus, distance courses must be centered on what teachers already know and the strategies, insights, and knowledge they need to measurably improve a problem of practice. Courses must focus on how teachers will enact the latest information and skills they learn, and which technologies—audio, video, multimedia—and formats—synchronous discussions, asynchronous reflections—can best help with both learning and classroom implementation of what they have learned.

### 11.3.3 Design for Learning Differences

Teachers, like the students they teach, may have undiagnosed learning disabilities (such as dyslexia), or they may have poorly honed reading and writing skills. They may prefer one kind of media (such as video) over another (text). The challenge for distance learning programs is to address teachers' learning strengths and compensate for their weaknesses. In addition to the course design principles mentioned above, distance courses can do the following:

- **Use a variety of media.** Some modes of distance education are better than others for distinct types of learning. For example, *print-based* instruction and *radio broadcasts* may help teachers understand the characteristics of differentiated instruction but may be far less effective in helping teachers understand how to implement differentiated instruction. *Visual media*, such as animations and simulations, can help learners enhance their understanding of skills, such as differentiated instruction, or of processes, such as photosynthesis. They can demonstrate psychomotor or cognitive domainexpectations by showing the skill as a model against which learners can measure their performance. *Full-motion video* can be used to depict performance so that learners can emulate the processes, procedures, or behavior. *Images* can enhance vocabulary instruction and reading comprehension for poor readers. *Audio* narration can help poor readers comprehend information, and music can serve as a memory aid. (Again, Chapter 12 explores digital content and lists other specific tools for different content types, such as print, audio, video, and digital images.)

- **Use the multimedia principle to enhance learning.** Chapter 4 discussed multimedia learning—the concept that purposeful mixes of media are more effective for "sense making" and building "mental representations" of information than reliance on only one type of media (Mayer, 2009, p. 17). Thus, instructional design involves not just presenting information, but also presenting it in a way that encourages learners to engage in "appropriate cognitive processing" while also managing cognitive load (Mayer, 2009, p. 168).

Figure 11.3 outlines principles of multimedia design.

**Figure 11.3**
**Mayer's Cognitive Principles on Multimedia (Mayer, 2009)**

| Cognitive principle | To improve leaning and reduce extraneous cognitive load, do the following: |
|---|---|
| 1. Signaling principle | • Use cues that highlight the organization of the essential material. |
| 2. Multimedia principle | • Use words and pictures rather than just words alone. |
| 3. Segmenting principle | • Present multimedia in user-paced segments rather than as a continuous unit. |
| 4. Pre-training principle | • Define key terms or concepts before diving into descriptions of processes. |
| 5. Spatial contiguity principle | • Present corresponding words and pictures near rather than far from each other on the page or screen. |
| 6. Temporal contiguity principle | • Present corresponding words and pictures simultaneously rather than successively. |
| 7. Coherence principle | • Exclude extraneous words, pictures, and sounds. |
| 8. Modality principle | • Include animation and narration (versus animation and on-screen text). |
| 9. Personalization principle | • Use conversational, versus formal, language. |
| 10. Redundancy principle | • Use animation and narration versus animation, narration, and on-screen text. |
| 11. Voice principle | • Use a human voice to narrate versus a computer-generated one. |
| 12. Image principle | • People do not necessarily learn better when the speaker's image is on the screen. Therefore, the instructor should use his/her face only when there are no words or pictures or to establish instructor or social presence. |

In his final design principle, Mayer notes that these design effects may be stronger for low-knowledge learners than for high-knowledge ones (Mayer, 2009, pp. 271–272).

### 11.3.4 Design for Bichronous Learning

As discussed in *Chapter 5: Online Learning*, asynchronous and synchronous courses have benefits and drawbacks. From a materials design perspective, synchronous activities are easier to create although more challenging to teach and manage. But when designed to be interactive and collaborative, they can promote learning that feels less distanced—that allows learners to see each other, see their instructors, and feel part of a community.

On the other end of the continuum, asynchronous courses require error-free, highly engaging digital materials; thus, from a materials design perspective, they are more time-consuming and more expensive to design. Yet from an instructional perspective, asynchronous courses are easier to teach and manage. When designed well, with clear directions and learning outcomes, learners also can benefit from the sense of agency and being able to work at their own pace, time, and place of choosing.

Thus, distance education designers should maximize opportunities to get the best out of both modes of online learning and design for *bichronous* learning—that is, learning that employs synchronous and asynchronous activities (Dikkers, 2018). (Chapter 5 discusses bichronous learning in greater depth.) Synchronous activities such as experiments, debates, role-plays, and group solving can extend learner knowledge, provide opportunities for social-emotional interactions between peers and the instructor, and improve learner engagement. Asynchronous tasks, such as journaling, developing a portfolio, and discussions provide learners with opportunities to reflect more deeply and to hone important skills such as self-directedness and self-regulation. Asynchronous activities don't necessarily mean the learner always works alone. Instructors can structure learning opportunities that encourage collaboration-as-needed by accommodating flexible grouping options for completing work. Most critical is establishing norms for participation in a bichronous (asynchronous and synchronous) course to guide appropriate participation (Burns, 2020).

When thinking about asynchronous versus synchronous learning, course designers may want to consider the following questions:

- What's the best way to learn this body of knowledge or skills—alone or with others?
- When is it best for learners to work on their own time versus working in real time?
- How can we design asynchronous activities that are more collaborative?
- If we are bringing all learners together for a live class, how can we capitalize on this time together? What can learners do together that they cannot do alone?
- Can most learners join in a scheduled meeting? Does every learner have good connectivity and his/her own device?
- How can we design live Web-conferencing classes that are truly interactive?
- How can we best blend synchronous and asynchronous approaches within an overall unit of study? (Burns, 2020)

### 11.3.5 Design for Accessibility

The awareness of making all digital and distance learning opportunities accessible to all learners regardless of disability is increasingly at the forefront of instructional design. There are multiple options strategies for making online, blended, multimedia, and mobile learning courses accessible to all learners. Three are examined here—Universal Design for Learning guidelines; Universal Instructional Design (UID) principles; and the Web Consortium Accessibility Guidelines (WCAG). While they all share a common purpose (accessibility and inclusivity) and there is some overlap among the three, each is distinct.

## Universal Design for Learning[4]

Universal Design for Learning (UDL) is an instructional design framework that guides the development of inclusive learning environments for technology-based and non-technology environments. It advocates that learning experiences (goals, methods, materials, and assessment) be purposefully designed to reduce barriers and create greater accessibility for all learners by providing multiple and flexible methods of representation, action and expression, and engagement (CAST, Inc., 2022).

UDL is an extension of the principles of universal design (UD) in architecture, products, and services first introduced by architect Ron Mace and colleagues. According to the Universal Design Institute now named for Mace, "UDL is the design of products and environments to be usable by all people, to the greatest extent possible, without the need for specialized design" (Mace, 2019). One example of a barrier from the physical world would be stairs that are accessible to those who are ambulatory but not, in many cases, to the elderly, wheelchair users, those recovering from knee surgery, or maneuvering a baby stroller. A universal design to counter this barrier could be a ramp—which makes the building accessible to everyone.

A universal design example from the *virtual* world involves adding closed captions to a video. This helps individuals who are deaf or hard of hearing; it helps those whose first language is not the one spoken in the video; it makes it easier for people in loud or distracting environments such as schools or outside to access audio content.[5] These design choices offer the least restrictive—and alternatively strive to promote the most inclusive—environments. They place the barrier to learning not on the learner but on the curriculum—the goals, methods, materials, and assessments—that are the core of instructional design. This shift is the heart of UDL (CAST, Inc., 2022).

The UDL Guidelines developed by CAST are a tool used in the "implementation of Universal Design for Learning, to improve and optimize teaching and learning for all (learners)" (CAST, Inc., 2022). They revolve around three core principles that recognize the need to proactively design for learner variability:

- **Provide multiple means of engagement** to tap into learners' interests and backgrounds, their learning strengths, and to motivate them to learn. This may involve offering choices among various scenarios for learning the same competency to tap into diverse learners' interests, highlighting real-world relevance, providing a safe learning environment, challenging them appropriately, and motivating them to learn (Rose & Meyer, 2002; CAST Inc., 2022).
- **Provide multiple and flexible methods of representation** to give learners various ways of acquiring information and knowledge that reflect learner variability. This may involve flexible formats such as large print, voice-to-text applications, screen readers such as JAWS or NVDA, digital books or simply assuring that spoken information is also close captioned. This can also include modeling metacognition, providing outlines, semantic maps, and other such templates that help scaffold support.
- **Provide multiple and flexible means of expression** to provide learners with alternatives for demonstrating what they know and have learned. This may involve providing options for the use of different technology tools and incorporating different scaffolds, such as an online dictionary, job aids or chatbot support. This principle highlights the need to ensure that the means for expressing what one has learned align with that specific goal for learning; for

[4] Special thanks to Susan Bruckner, Education Development Center, for her guidance and feedback on UDL.

[5] UNICEF has long advocated UDL principles in basic teacher education, instructional design, and content development, particularly in Sub-Saharan Africa. See for example, UNICEF ESARO Guidance on Sign Language for Deaf Children's Education and Its Use in Accessible Digital Teaching & Learning Materials (2021).

example, the means to demonstrate learning are not in themselves the barrier.

Educators, including curriculum and assessment designers, teachers and distance instructors can improve educational outcomes for diverse learners by applying these principles to the development of goals, instructional methods, classroom materials, and assessments.

A significant body of research on learning and individual differences supports the three core principles of UDL: multiple means of engagement, multiple means of representation, and multiple means of expression and action. (See citations in Basham et al., 2018, pp. 484–485). UDL ultimately helps instructional designers make online, multimedia, blended, and mobile learning as accessible as possible—for learners with visual, auditory, cognitive, or motor impairment, in particular. But the ultimate goal of UDL is to ensure that learning is purposeful, motivated, goal directed, inclusive and accessible to all learners.

### Universal Instructional Design

Teachers, like their students, have variability in preference, learning style, strengths, and challenges.  Instructional designers are increasingly designing with this realization of both the online instructor and teacher-learner variability in mind, particularly in the case of Web-based learning, to provide a better experience for all users, including those with disabilities.

Based on UDL, and also expanding on universal design (UD) in architecture, products, and services, is Universal Instructional Design (UID)—the design of instructional materials and activities that make learning goals achievable by "individuals with wide differences in abilities to see, hear, speak, move, read, write, understand English, attend, organize, engage, and remember" (Burgstahler, 2007, p. 1, as cited in Elias, 2010). Figure 11.4 lists various principles of UID and demonstrates how designers can develop a Web-based distance education course that conforms to these principles.

### World Wide Web Accessibility Guidelines

UDL is aimed at a broad range of learners, but learners with sensory, physical, and/or cognitive impairments may need greater accommodations. The Convention on the Rights of Persons with Disabilities (United Nations Department of Economic and Social Affairs, 2022); the Incheon Declaration (United Nations Educational, Scientific and Cultural Organization (UNESCO) et al., 2016); and the Sustainable Development Goal Target 4.56 all aim to ensure equal access to all levels of education for learners with disabilities (Burns, 2021). The United Nations has put in place robust design guidelines for distance courses for learners with special needs as well as those in emergency contexts (UNESCO, 2022). The European Union has explicit standards governing the design of distance and technology-based learning experiences (European Telecommunications Standards Institute, 2021). And in the United States, Title I of the Americans with Disabilities Act requires employers to provide reasonable accommodations to employees with disabilities, which could include providing assistive technology or other resources. Section 508 of the 1998 amendment to the Rehabilitation Act of 1973 requires all U.S. government digital content to be accessible (General Services Administration, 2022; United States Equal Employment Opportunity Commission, n.d.; United States Department of Health and Human Services, n.d.).

Those providing any type of Web-based distance learning should consult with the World Wide Web Content Accessibility Guidelines (WCAG) (World Wide Web Consortium, 2021). The guidelines are specifications or criteria *about* accessibility—they don't tell an instructional designer *how* to create accessible eLearning experiences. The designer must interpret the guidelines and apply them

[6] Sustainable Development Goal 4: Target 5 aims by 2030 to eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities.

**Figure 11.4**
**Universal Instructional Design Principles: Example of Application for Web-Based Learning (Adapted from Mace, 2019; Elias, 2010)**

| Universal Instructional Design Principle | Examples of Materials and Design That Create Universal Accessibility |
|---|---|
| **Equitable use.** The design is useful and accessible for learners with diverse abilities and in diverse locations. | • All content online<br>• Anytime, anyplace<br>• Content available in local languages<br>• Context is localized<br>• Educational culture reflected in content and assignments |
| **Flexible use.** The learning design accommodates a wide range of abilities, preferences, schedules, and levels of connectivity. It provides learners with choice in methods of use. | • Multiple formats for information (print, audio, video, online, and CD-ROM/DVD/VCD-based) for learners with variable rates of connectivity<br>• Mind maps, diagrams, and visual displays<br>• Conferencing tools<br>• Video and audio presentation and assignment tools<br>• Slide presentation tools<br>• Links to additional information<br>• Choice of study of topics and assignments<br>• Assignments addressing multiple learning styles |
| **Simple and intuitive use.** The course interface is easy to understand regardless of the user's background or knowledge. | • Simple interface<br>• Direct link to new posts<br>• Easy-to-navigate menus<br>• Books<br>• Searchable forums and content<br>• Mobile interface<br>• Access to offline resources |
| **Perceptible information.** The design communicates necessary information effectively to the user, even if the user has sensory impairments (e.g., vision problems, reading disabilities). | • Screen preferences, adequate font size, masking, and colors<br>• Screen readers<br>• Text-to-speech and speech-to-text capabilities<br>• Captions for images and videos<br>• Simple language<br>• Chunk information (bullets, short paragraphs)<br>• Sufficient white space on pages<br>• Meaningful images with important text highlighted |
| **Tolerance for error.** The design minimizes adverse consequences of mistakes. Users can easily undo their mistakes. | • Easy for users to get back to where they were after making a mistake<br>• Ability to edit after posting<br>• Spell check<br>• Confirmation before sending<br>• Confirmation before deleting<br>• Warnings when leaving course site |

| Universal Instructional Design Principle | Examples of Materials and Design That Create Universal Accessibility |
|---|---|
| **Low physical and technical effort.** The design can be easily and comfortably used with minimal physical and mental fatigue. | • Predictable and realistic amount of work<br>• Sufficient bandwidth so user doesn't need to wait too long for audio, video, and multimedia content to load<br>• Voice recognition<br>• Word prediction<br>• Built-in assistive technologies<br>• Limited use of external links<br>• Embedded multimedia and assistive technologies (e.g., screen readers)<br>• Browser capability checker<br>• Automatic redirection to resources |
| **Community of learners and support.** The learning environment promotes interaction and communication among learners and between instructor and learners. | • Uses community learning approach<br>• Organizes offline activities (such as study groups, face-to-face meetings)<br>• Links to support services<br>• Provides ample opportunity for large-group and small-group discussions<br>• Uses social media (e.g., *Skype*, *VoiceThread*, *Flip*), which allows users to see one another in real time<br>• Provides online or face-to-face *coaching* for learners<br>• Provides online or face-to-face *mentoring* for learners<br>• Enables "verbal immediacy" from instructor—respond to learner's questions or concerns immediately<br>• Supports regular communication (e-mail, SMS, chat, cell phones) from instructor to learners |
| **Instructional climate.** The instructor communicates high expectations. The instructor's comments are welcoming and inclusive. | • Instructor is involved in discussions<br>• Instructor is available through several means (face-to-face, via Internet, via phone) for one-to-one discussions and assistance<br>• Instructor is nonjudgmental<br>• Learners are motivated by the instructor<br>• Instructor offers noncritical useful feedback, helping learners address misunderstandings |

to eLearning courses. The higher-level WCAG guidlines, minus supporting information, are noted below. A full copy of these accessibility guidelines can be obtained from the Bureau of Internet Accessibility (see the Reference section at the end of this chapter).

- **Guideline 1.1:** Provide alternative text for all content that is not text.
- **Guideline 1.2:** For live or pre-recorded multimedia provide synchronized alternatives such as captions.
- **Guideline 1.3:** Information and structure must be separable from the way the information is visually presented.
- **Guideline 1.4:** Make information in the foreground easily distinguishable from its background.
- **Guideline 2.1:** All functionality should be operable through a keyboard interface.
- **Guideline 2.2:** The user must have control of time limits on reading or interaction.

- Guideline 2.3: Users must be able to avoid content that may cause seizures or physical harm due to sensitivity to light and flashing content.
- Guideline 2.4: Users should have mechanisms to assist them in finding content, orienting themselves within it, and navigating throughout it.
- Guideline 2.5: Allow users to navigate and operate controls through various input devices, not just a keyboard.
- Guideline 3.1: Text content must be readable and understandable.
- Guideline 3.2: Placement and functionality of content needs to be predictable.
- Guideline 3.3: Help users avoid mistakes, but if errors are made, make clear how they can easily correct them.
- Guideline 4.1: Compatibility with current and future user agents (namely, assistive technologies) should be supported (Bureau of Internet Accessibility, 2021, pp. 1–9).

The WCAG sets three ascending levels of conformance: A, AA, and AAA. Level A success criteria include some of the most important accessibility checkpoints, but conformance to this level is insufficient since it leaves many critical accessibility barriers unaccounted for, rendering the website unusable and inaccessible for millions of learners. On the other hand, Level AAA success criteria include a number of aspirational accessibility checkpoints that, in the words of the World Wide Web Consortium (W3C), may “not be possible” to achieve. In an attempt to reconcile this tension, the W3C, through the Bureau of Internet Accessibility, recommends against defining Level AAA as a target level of conformance, stating that “it is not possible to satisfy all Level AAA Success Criteria for some content.” Instead it strongly recommends that organizations maintain their websites, online courses, and apps to conform with all success criteria required for Levels A and AA (also known as A/AA) (Bureau of Internet Accessibility, 2021).

Assuring accessibility involves the use of appropriate hardware (e.g., assistive devices such as adapted trackballs), applications (e.g., screenreaders), content (discussed in the next chapter), the accessibility features of the tools that course designers use to create content (e.g., *Articulate 360* or MS *Office*), and course designer awareness. Space does not permit a full accounting of all the accessibility considerations of which course designers should be aware (e.g., the orientation of documents, proper heading orientations, or designing hover states for a cursor) and the course design team will hopefully include an expert who ensures accessibility compliance. A good place for the layperson to start, however, is to understand the impact of Alt-text, high contrast colors and typefaces/fonts.

Alternative text for images. Alternative text (alt text) is a concise description of a visual element, like an image or icon, that allows visually impaired users to understand the element and its context. Alt text also helps search engines understand and index the content of a page more easily. Many, if not most eLearning authoring tools, support this feature.

High contrast colors. Strong color contrast makes course elements easier to read and can make a course site attractive. It is a more critical importance, however. Many online learners, particularly males, will most likely have distinct types of color blindness and other visual impairments (National Eye Institute, 2019). High-contrast colors involves a combination of two or more contrasting hues, making it easier for users to find what they are looking for. They can be used for background and foreground elements, including text, icons, and images, to differentiate between the elements on the page.

Web sites such as *Color Safe*, *Contrast Grid*, and *Coolors*[7] allow course designers to see which combinations of high-contrast colors can be easily distinguished from one another by learners with color blindness; in the case of *Contrast Grid*, a table for each theme outlines which colors can be used together while maintaining a sufficient contrast ratio.

**Typefaces and fonts.** Typefaces and the font families[8] that comprise them influence the accessibility of a course site and the learner's ability to navigate that site. They also influence *legibility* (how distinguishable individual characters and words are to the eye of the reader) and *readability* (how easy it is to read the text overall) (Burns, 2019b, 2019c). Aging, the distance at which learners sit from a screen, font size, the degree of white space on a screen, lighting, screen resolution, and vision issues all affect readability and legibility (Carey, 2011; Tennant, 2011). Thus, using the same typeface and font family and assorted sizes of fonts (heading fonts and body fonts) cues the reader to the organization of text and navigation of the site—important markers for reading from a screen. Conventional wisdom within the eLearning design community has long exhorted that *sans-serif* typefaces (such as Calibri) typically enhance legibility and are best for reading off a screen while *serif* typefaces (e.g., Times New Roman) are best for reading printed documents (Burns, 2019c). However, as with many technology-associated topics, the research around such dichotomous recommendations remains inconclusive.

Font choices also influence a learners' responses to content, working memory, and learning (BBC News, 2010; Carey, 2011; Diemand-Yauman et al., 2010). Unfamiliar font types can create difficulty for learners. Some of this difficulty may be desirable—requiring greater attention and deeper cognitive processing because hard-to-read typefaces are more distinctive and involve greater attention to the task of reading. This, in turn, results in increased measurable outcomes in terms of learning (Diemand-Yauman et al., 2010). However, for learners with any kind of reading or visual impairment, unfamiliar font types may be undesirable—simply creating a higher level of unnecessary cognitive load that interferes with learning (Skulmowski & Xu, 2022).

Once developers finish designing their online course, they can use a number of free online sites, (for example, accessibilitychecker.org) to audit their course to ensure accessibility compliance.

Accessibility is a critical instructional design feature of any distance course; it is also a salient content development consideration and will thus be revisited in Chapter 12.

### 11.3.6 Design for Flexibility

One of the most common misconceptions in distance education is that face-to-face curricula can be transferred wholesale to a distance education environment (Herman & Banister, 2007). Although this unfortunately has often been the approach, distance education courses must instead be designed flexibly and specifically for the medium through which they will be delivered—be it radio, television, immersive environments, multimedia, or online courses (Hope, 2006).

"Flexible design," like the rubric under which it falls, instructional design, is a broad term that advocates providing learning resources and technologies to all learners in order to create, store, and distribute content (Hertz et al., 2020; Hope, 2006). It proposes that content be organized in multiple formats, used in a variety of activities, and be accessible through a variety of technologies to allow for customized learning

[7] Color Safe: http://colorsafe.co; Contrast Grid: https://contrast-grid.eightshapes.com/; and Coolors: https://coolors.co/

[8] A typeface is the set of design features for letters and other characters. A font family is a collection of fonts that share particular design features within a specific style of typeface. Read more about fonts in *Appendix 2: Glossary*.

experiences. Some of the key dimensions of flexible design include the following.

- **Medium of delivery.** The strengths of the technology delivery mode or model should be maximized, while its weaknesses should be mitigated.
- **Organization.** Content,[9] activities, and experiences should be sequential, cumulative, and coherent (South African Institute for Distance Education [SAIDE], 2005). They should be highly interactive and allow for a range of levels of learning, learner entry points, and experiences. Course designers should provide a "hook"—a question, dilemma, scenario, or problem—to immediately engage learners.
- **Types of learner experiences.** Flexibly designed courses favor ill-structured activities over well-structured ones, interactivity over passivity, inductive over deductive instruction, and activity over text and lecture. Such course design supports both individual and group learning and promotes applied approaches to learning.
- **Digital tools.** Digital tools must be functional, provide multichannel opportunities to build understanding of complex concepts, and allow for the completion of a range of tasks, including finding information, communicating, writing, reflecting, and organizing information) (Moon et al., 2005). Specifically, for an online course, LMSs such as *Canvas* or *Moodle* and digital libraries should be easy to navigate and understand. Fosnot's (1996) exhortation that technology should be not just a mode of delivery but a tool that supports constructivist learning opportunities—concrete, contextually meaningful experiences through which learners can search for patterns; raise their own questions; and construct their own models, concepts, and strategies—is as true today as it was decades ago.

In addition to being flexibly designed, distance courses should be flexibly delivered. "Flexible delivery" is a user-centered approach in which the providers commit to tailor courses to meet learners' individual needs (Hertz et al., 2020; Luschei et al., 2008). Flexibly delivered courses offer the following:

- Realistic options and choices in terms of time, place, and technology
- Multiple modes of delivery—in the workplace; at home; and in block modes, modules, interactive formats, and other nonstandard modes of delivery
- Alternative options—including on-campus and in-class; as independent lectures, seminars, tutorials, and practical sessions, as well as hybrid learning
- Accommodations for learners' diverse learning needs
- Use of technology and resources to provide options to any learners to access and use materials in their own place (e.g., Web-based teaching materials and exercises or assessments that are not platform specific or that are platform diverse) (Andrade & Alden-Rivers, 2019; Luschei et al., 2008).

As noted at the beginning of this chapter, inadequately designed distance courses have deleterious repercussions for the success of a distance education program. A poorly designed course may require excessive compensatory amounts of teaching and person power in terms of live presentations or ongoing coaching. It may have a high failure rate because learners are confused. It may result in the lowering of exit performance standards—or it may result in all of these. In contrast, well-designed courses lead to greater levels of participant learning and satisfaction (Costley & Lange, 2017).

[9] "Content" refers to text-based and multimedia content, including learning objects, all supporting materials (handouts), and technology elements such as video and audio, and it is discussed in detail in Chapter 12.

### 11.3.7 Design for Reduced Extraneous Cognitive Load

Chapter 1 briefly touched upon cognitive load, a concept that is highly relevant to technology-based learning, particularly online learning. Briefly, there are three types of cognitive load:

- **Intrinsic cognitive load.** This is about *content*—the complexity of the learning content in addition to the learner's prior knowledge of the content.
- **Germane cognitive load.** This is about *cognitive processing*—the cognitive resources that must be devoted to generating and storing newly acquired knowledge into long-term memory.
- **Extraneous cognitive load.** This is about *design*—the nature of how information is presented (Costley & Lange, 2017; Skulmowski & Xu, 2022; Sweller, 1988).[10]

Cognitive load theory argues that to achieve long-term learning, instructional designers must understand the limited capacity of working memory in conjunction with virtually unlimited long-term memory. Design choices around the organization, presentation, and sequencing of content, materials, and activities can induce extraneous cognitive load, thus interfering with the learner's ability to process information in working memory and encode that information into long-term memory (Skulmowski & Xu, 2022; Sweller, 1988). The task for instructional designers then is to reduce this extraneous cognitive load in order to leave sufficient cognitive resources to facilitate learning (Costley & Lange, 2017; Hultberg et al., 2018; Skulmowski & Xu, 2022).

Figure 11.5 (next page) suggests strategies for decreasing *extraneous* cognitive load to allow for greater long-term learning.

There are other design elements that can be used to reduce extraneous cognitive load—for example, elaboration and backward chaining (See Chapter 10, Figure 10.4). Figure 11.3, Mayer's Cognitive Principles on Multimedia offers strategies to reduce extraneous cognitive load. In short, instruction and the sequencing of instructional activities and materials must be designed in ways that *facilitate* learners' long-term memory and efficient retrieval of stored information at a future point in time versus impeding it (Costley & Lange, 2017; Hultberg et al., 2018; Roediger III & Butler, 2011; Skulmowski & Xu, 2022).

## 11.4 Time and Cost Considerations

All of these design considerations have time and cost implications. Because of the prevalence of data of online learning, vis-à-vis other distance modalities, this section primarily examines the time and cost considerations associated with *online* learning.

Two caveats frame the information in this section. First, because of the variability of online courses, estimating cost and time requirements for online learning are typically based on "one hour of online learning."

Second, the time and cost required to design an online course will obviously depend on the type of course (synchronous, asynchronous, bichronous); the content used; course length and requirements; the degree of interactivity; and the skill, size, and composition of the instructional design team and whether or not the instructional design team uses an instructional design framework. It will also depend on local salaries and benefits, the kind of software and platforms employed (enterprise versus open source), and whether the course has an instructor or not.

Given such variability, it is not surprising that there is no one definitive amount of time or a fixed cost for creating an online course. There are, however, well thought out estimates of time and cost that can guide distance education planning.

[10] This is a simplified version of cognitive load theory (CLT), and the theory has undergone updates since first developed; however, CLT largely hews to the framework described here.

**Figure 11.5**
**Design Strategies to Reduce Extraneous Cognitive Load**

| Design Strategy | Explanation |
|---|---|
| **Ensure course design consistency** | • Make sure that content and learning activities are consistently organized in a predictable pattern (Herman & Banister, 2007).<br>• Design routines. The same types of content should be posted in the same places each week (e.g., weekly checklist first, then readings, then a link to the discussion board, followed by small assignments). This consistency also reduces learner anxiety (Herman & Banister, 2007).<br>• Use consistent fonts, colors, logos, visual organizers, and navigation, which enhances learner automaticity of navigation and access of materials.<br>• Create modules or sessions that are more or less the same length. |
| **Focus on design clarity** | • Pay attention to ease of access and navigation, as well as to design features such as the use of sufficient white space, graphic organizers, bulleted and "chunked" text, and visuals and color to aid in comprehension and retention of information (Mayer, 2009).<br>• Ensure that materials are clear and intuitively organized. This significantly reduces extraneous cognitive load and influences learners' satisfaction and perceived learning of course material (Costley & Lange, 2017; Mayer, 2009; Swan, 2006). |
| **Minimize reading from a screen in favor of other digital tools** | • Chapter 1, Figure 1.2 discusses the challenges of reading from a screen: Print and text are often less effective means of explaining concepts and processes (Taflinger, 2011).<br>• Graphic organizers, images, immersive activities, and video all can provide rich conceptual, procedural information without taxing the learner's cognitive load, as is the case with reading from a screen (Taflinger, 2011).<br>• Provide print packets of course readings and text-based materials to reduce reading from screens. |
| **Organize content from basic to complex** | • Information should move sequentially from simple to complex, concrete to abstract, and general to specific (Hultberg et al., 2018; Moon et al., 2005).<br>• Match the complexity of the material to the level of expertise of the learners (use assessments) and present material sequentially.<br>• Organize information from basic to increasingly complex concepts so learners are able to retain more information in their working memory (Moon et al., 2005). |
| **Build in opportunities for retrieval practice** | • **Retrieval practice** involves "situations in which knowledge is expressed, including situations where learners must produce the answer to a factual question, explain a concept, make an inference, apply knowledge to a new problem, and produce creative and innovative ideas" (Karpicke & Grimalidi, 2012, as cited in Hultberg et al., 2018, p. 33).<br>• There is much evidence for the benefit of retrieval practice (Brame & Biel, 2015, as cited in Hultberg et al., 2018; Roediger III & Butler, 2011).<br>• To build in opportunities for retrieval practice, consider the following:<br>  ◦ Test learners' prior knowledge, particularly when the test is more challenging for memory (See *Chapter 17: Assessing Distance Learners)* |

| Design Strategy | Explanation |
|---|---|
| **Build in opportunities for retrieval practice** *(continued)* | ◦ Design low- or no-stakes quizzes (formative assessment)<br>◦ Develop self-tests<br>◦ Have learners demonstrate understanding by solving hands-on or authentic problems that require the use of the key underlying concepts and principles (Hultberg et al., 2018, p. 34) |
| **Use distributive practice** | • **Distributive practice**, or spacing, involves distributing retrieval practice over time, thus encouraging learners to schedule shorter study sessions over a longer period of time and avoid "cramming."<br>• It is based on "Forget to Learn Theory" (Carey, 2014, as cited in Hultberg et al., 2018, p. 34)—learning is strengthened when a learner has time to partially forget the material before recalling it to complete a task or answer a question.<br>• The main purpose of spacing is to disrupt memory loss in order to improve long-term retention. (Research shows that shorter study time increments over a longer period of time is more effective than cramming [Hultberg, et al., 2018, p. 34])<br>• To build in opportunities for distributive practice or spacing, consider the following:<br>◦ Carefully structure courses, explicitly communicate the distributive practice to learners, and provide a syllabus that makes this structure and expectations clear and transparent<br>◦ Design assessment strategies that space out assignments during the course of study in a way that stimulates learners to practice their knowledge and skills over time, helps diagnose and monitor achievement of learning outcomes, and provides multiple opportunities to give constructive feedback to learners<br>◦ Include short reviews at the beginning of each class as a recap of previous material (Hultberg et al., 2018, p. 35) |
| **Interleaving** | • **Interleaving** is the practice of mixing related but distinct material during learning sessions, obliging students to discriminate between problems and select appropriate solution methods given the context.<br>• Learning improves if learners study and switch between multiple concepts or problems during a single course session, and the general rule is to switch to a second concept before they have mastered the first concept (Lang, 2016, as cited in Hultberg et al., 2018, p. 37).<br>• To build in opportunities for interleaving, consider the following:<br>◦ Pose questions that elicit explanations, such as those with the following question stems: why, what caused X, how did X occur? What if, what-if-not, how does X compare to Y, why is X important? Use these types of questions especially when learners struggle expressing explanations on their own.<br>◦ Focus on deep questions and model answers to these questions in order for learners to build a more complex understanding of a topic and to build deeper explanations of key concepts. Deep explanations mean explanations that focus on causal mechanisms, planning, well-reasoned arguments, and logic.<br>◦ Alternate practice of diverse types of content. When teaching, ask learners to alternate between distinct types of problems or ideas, rather than covering ideas sequentially.<br>◦ When giving multi-step problems, encourage learners to identify and label the substeps required for solving the problem (Hultberg et al., 2018, p. 38). |

### 11.4.1 Time Requirements

Perhaps the best known estimate of time needed to design an online course is (still) that of the Chapman Alliance (2010). As Figure 11.6 outlines, they sort eLearning into three levels—from least to most interactive (Figure 2.3 in Chapter 2 defines "interactivity"). In turn, they crosswalk each of these three levels with their rigor and intended outcomes, categorizing them as "simple," "average," or "complex."

- Simple courses involve basic content, such as readings, passive experiences, and limited deliverables from learners. They are often repurposed in-person activities.
- Average courses include many "try it yourself" exercises and deliverables from learners.
- Complex courses require extended time by learners, more advanced interactions, more customization, and more complex learner deliverables).

A more focused and recent lens through which to examine eLearning development time comes from Defelice (2021) who, based on surveys of 264 online course developers, documents the time needed to develop one eLearning course *module.* She defines a "module" as a block, session, or unit of study for each instructional product (personal communication, January 12, 2023). These development times are shown in Figure 11.7 and are organized by level of engagement or interactivity. As an example, a 20 minute "passive" module, essentially focused on information consumption, requires an average of 48 hours to create.

**Figure 11.6**
**Time Needed to Design "Leveled" Online Courses (by Hours) (Chapman Alliance, 2010)**

| Levels of eLearning | Simple | Average | Complex |
|---|---|---|---|
| **Level 1 (Basic):** Level 1 typically involves *PowerPoint* presentations, readings, graphics, perhaps simple audio, perhaps simple video, and test questions. These are basically pages with assessment. | 49 | 79 | 125 |
| **Level 2 eLearning (Interactive):** Level 2 includes the above eLearning content plus 25% (or more) interactive exercises, allowing learners to perform virtual exercises, and liberal use of multimedia (audio, video, and animations). | 127 | 184 | 267 |
| **Level 3 eLearning (Advanced):** Level 3 is highly interactive, possibly simulation or serious game-based, uses avatars, has custom interactions, and is an award-winning caliber courseware. | 217 | 490 | 716 |

**Figure 11.7**
**Average Time (in Hours) Required to Develop eLearning Modules by Degree of Learner Engagement (Defelice, 2021)**

| Modules: Levels of engagement | Average module length (minutes) | Average time to develop (hours) |
|---|---|---|
| Passive (readings, watching videos) | 20 | 48 |
| Partial engagement (drag and drop, roll overs, simple animations, and gamified elements) | 26 | 84 |
| Moderate engagement (some games, activities, animations) | 20 | 116 |
| Full engagement (many immersive games, scenarios, simulations) | 17 | 155 |

The above information sheds some light on the final product of the instructional design process. But there are differences in time estimates—Tucker (2019), for example, suggests that one hour of eLearning requires approximately 184 hours.

A bigger question than the total number of hours of development time centers on the design process itself. On what tasks do eLearning developers primarily devote this development time? What course development tasks require more versus less time? Figure 11.8 breaks down Tucker's estimate of 184 hours visually displaying the various activities that one hour of eLearning development comprises.[11]

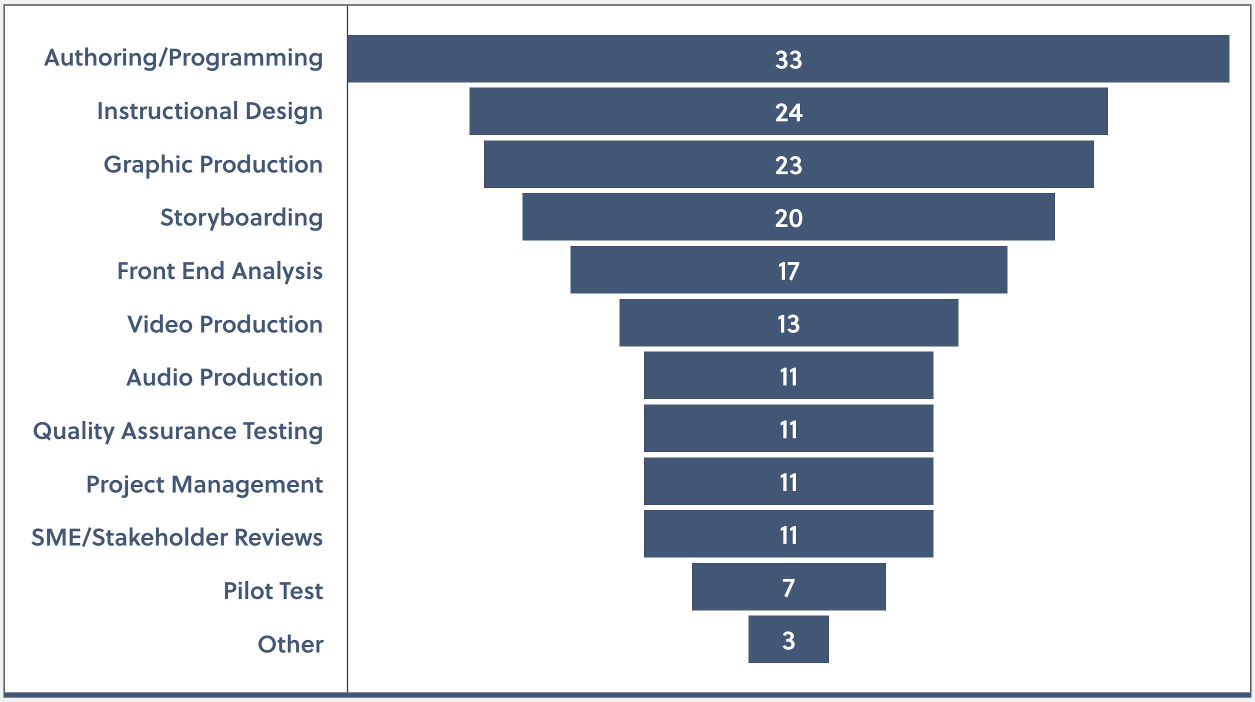
While time estimates vary, the above figures can at least guide distance education programs as they assemble an instructional design team, develop scopes of work, and plan a deliverable timeline.

### 11.4.2 Cost Requirements

It is challenging to calculate the exact amount of time needed for distance course development—and it is equally difficult to determine a precise cost. As will be echoed in *Chapter 12: Developing Content*, costs depend on a variety of factors—the type of course, its length, degree of interactivity and rigor.

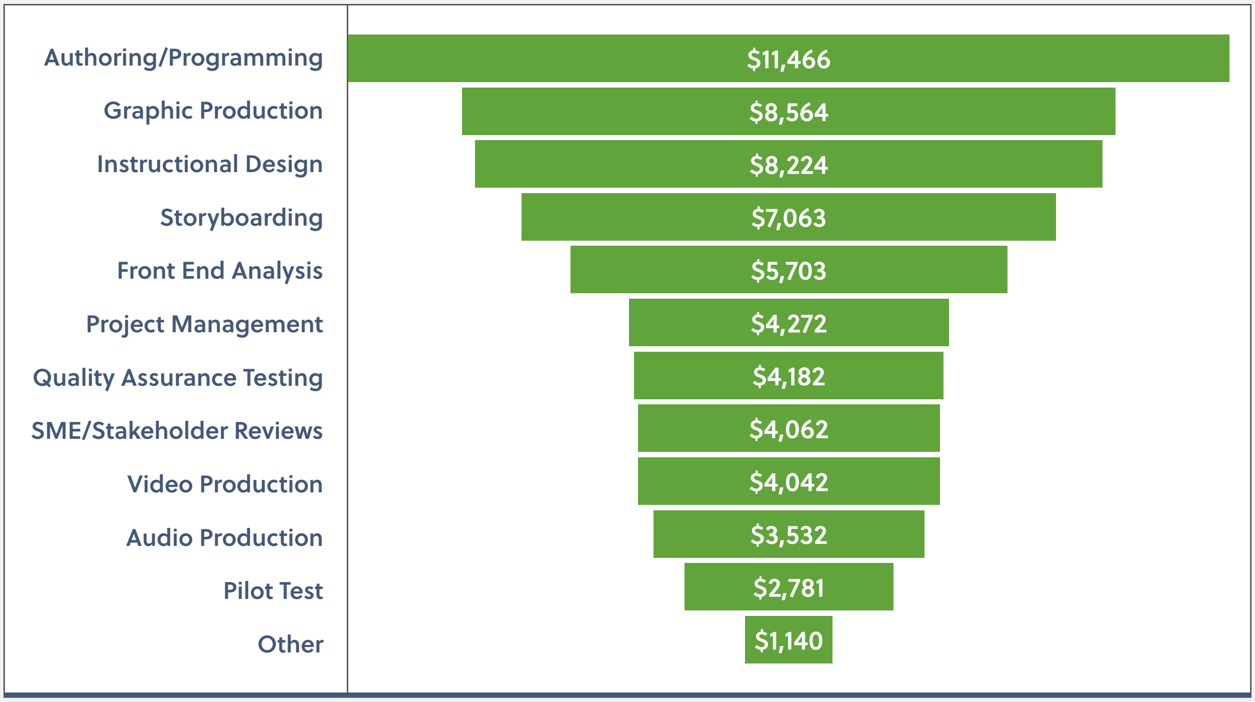
To assess the cost of designing an online course, we turn again to the Chapman Alliance's detailed cost information. For the Level 1, 2, and 3 courses discussed in Figure 11.6 and which differ by levels of interactivity, the Chapman Alliance (2010) estimates development costs of $12,980 for simple courses, $23,991 for average courses and $65,031 for complex courses. Overall, it estimates that on average one hour of eLearning costs $65,030 to produce (All of these amounts have been recalculated into 2022 dollars).

**Figure 11.8**
**Breakdown of Tucker's Estimation of Hours Required to Develop One Hour of eLearning (Calculations based on Tucker, 2019)**




[11] While Tucker disaggregated these tasks by *percentage*, this chart calculates those percentages into *actual hours*.

**Figure 11.9**
**Cost Per Online Course Development Activity Required to Develop One Hour of eLearning (Calculations based on Chapman Alliance, 2010; U.S. Department of Labor, n.d.)**




Chapman Alliance data also attach specific costs to the eLearning development activities visually displayed in Figure 11.8 per one hour of online learning. This cost breakdown is based on their $65,030 estimate and is illustrated in Figure 11.9 (above). All cost data are converted into 2022 USD.

Unfortunately, there are a number of weaknesses with these precise cost estimates. For example, in Figures 11.8 and 11.9 audio and video materials are costed out but other forms of content, such as print or text, which often constitute the bulk of online learning courses, and multimedia, are not. These cost estimates also fail to identify whether the course is synchronous, asynchronous, or both, and whether the cost of course delivery includes the cost of an instructor (for courses that have one). Research from U.S. online schools reports that they can spend between $2,334 and $3,821 on instruction per full-time equivalent (FTE) learner (Hoxby, 2017, p.424).

We also can examine the cost of distance courses via modality as Figure 11.10 does. Using original 1998 cost data from South Korea's National Open University (KNOU) converted to 2022 USD, Figure 11.10 estimates total costs and costs per learner of three distance-based modalities—TV, radio, and online learning—with more detail about content and instruction.

As Figure 11.10 (next page) suggests, TV, radio, and online courses all come with significant production costs. However, online learning reaches fewer learners and has higher costs per learner completion versus TV or radio-based distance courses. While this allows us to determine costs *prima facie*, it does not allow us to determine the worth or value of the educational experience offered by these three modes.

Thus, as seen in this section, developing distance courses—particularly online ones, and particularly those that are interactive and rigorous and that involve the use of rich media such as video and multimedia—require considerable time and resources. The greatest barrier by far to distance course development is limited resources—time,

**Figure 11.10**
**Costs of Distance Education at KNOU Converted to USD (2022)**
**(Jung, 2000, p. 229; U.S. Department of Labor, n.d.)**

| Modality | TV-Based Course | Radio-Based Course | Web-Based Course |
|---|---|---|---|
| Type | 16 weeks, 3 credit | 16 weeks, 3 credit | 16 weeks, 3 credit |
| Media | Textbook, TV programs, and face-to-face instruction | Textbook, radio programs, and face-to-face instruction | Textbook, video and audio clips, and online instruction |
| Number of learners | 1000 | 1000 | 30 |
| Cost to produce and deliver (USD) | $137,659 | $60,226 | $22,370 |
| Cost per learner (USD, rounded) | $138 | $60 | $746 |
| Attrition rate (%) | 60% | 60% | 10% |
| Cost per completed learner (USD) | $344 | $151 | $829 |

budget, skilled personnel, and tools (Defelice, 2021). Those wishing to design quality online courses need to ensure that they have sufficient amounts of all four of these resources.

## 11.5 Piloting Distance Courses[12]

Finally, at the culmination of the instructional design process, distance education providers should make every effort to pilot their courses. A pilot is a user test or a dry run of the online course before it is fully launched. It is an opportunity to test out the course in "petri dish" conditions with a smaller cohort of users to gather information on the technology, directions, content, activities, and whole user experience, so that any problems can be fixed before the course is fully launched (Burns, 2019a).

There are numerous reasons to pilot an online course, the most important of which is that piloting has a *formative* function—allowing course designers to "dip stick" the effectiveness, usability, and functionality of the course from a broad user perspective, thus informing designers about what works and what doesn't so that problems can be fixed. Pilots also serve as an early warning system about the technology, particularly regarding whether it facilitates or impedes the desired teaching and learning of the course. And pilots serve as an early warning system about the *educational* aspects of the course—distance education providers may discover that content, activities, and assessments are simply too complex or simplistic, irrelevant, or inappropriate for their intended audience, or that directions are so unclear that the learner doesn't know what to do (Burns, 2019a).

[12] This section is adapted from Burns (2019a) "Yes, You Should Pilot Your Online Course: A Few Things To Consider As You Do," eLearning Industry, https://elearningindustry.com/pilot-your-online-course-things-consider. Adapted with permission from eLearning Industry.

Pilots have numerous purposes and numerous beneficiaries. In addition to course designers, they also can help *funders and decision-makers* understand what additional resources may be necessary to ensure that online courses are a success. They can help orient, prepare, and introduce *online learners* (especially novice ones) to the rigors, demands, and responsibilities of an online course, especially those courses of medium and long duration. They also help *online instructors* self-assess, and be assessed, on their own performance so they can adjust facilitation strategies, response time, presentation of content, and directions. They can allow *education officials at national, regional, and district educational offices to* understand what sorts of offline supports are necessary to help teachers transfer learning from the online course to their actual classrooms (Burns, 2019a). Finally, they are an important first step in an overall process of quality assurance.

A pilot should have two main traits. First, it should be done *before* the full launch of an online program, not after, although it doesn't have to be 100% complete. Second, it should be *formative* in nature, not evaluative. A pilot's aim is to identify what works for the user and what doesn't, so designers can undertake evidence-based corrective actions, inputs, supports, and design considerations to ensure a successful teaching and learning experience for the online instructor and learners (Burns, 2019a).

## 11.6 Conclusion

One of the major benefits of distance education is that it can provide opportunities to a broad expanse of learners and to nontraditional or traditionally underserved learners. But to truly support those who learn in nontraditional ways, and to address the variability of every learner, distance education must continue to move beyond a one-size-fits-all approach and offer multimodal learning opportunities that are differentiated according to learner needs.

**Figure 11.11**
**Instructional Design Resources**

- **Online course design is both science and art.** Check out an example of an eLearning module (created in Articulate *Storyline*) as well as U.S.-based instructional designer Jodi Sansone's eLearning design portfolio.
- **Instructional design information and resources.** Two comprehensive sites are InstructionalDesign.org and Instructional Design Central.
- **Learn how to do instructional design.** Follow the MIT and New Media Consortium's "Online Course Design Guide's" comprehensive step-by-step framework on designing distance courses.
- **eLearning authoring tools.** See eLearning Industry's review of all eLearning authoring tools.
- **Instructional design checklists.** Cathy-Moore.com offers a number of good online tools, rubrics, and websites to help designers evaluate their instructional design process. Access her checklist for strong design. Check out, too, the Articulate.com eLearning course review checklist. Finally, the Course Design Rubric Standards (6th edition) can guide institutions of higher education in designing quality courses (Quality Matters, 2019).

As the "father of instructional design," Robert Gagné, noted, not all instruction is equal (Gagné & Briggs, 1974). Therefore, distance courses must integrate an array of experiences, assignments, activities, and assessments that allow learners to interact and practice with content in multiple ways; on multiple cognitive levels (comprehending information, applying it, analyzing its effects, and evaluating its impact); and using multiple measures and methods to assess this learning. This is the essence of instructional design.

The ultimate goal of instructional design is to "promote better understanding of concepts so that effective learning can occur" (Costley & Lange, 2017, p. 186). To do this, and to create the diverse experiences mentioned above that all learners require and that address the variability of human learning, instructional design must be grounded in an understanding of learning—specifically adult learning. It must link theory to practice and ensure that overall design is flexible, attractive, engaging, and free from extraneous cognitive load. It must capitalize on and customize various technologies, such as multimedia, to reach the greatest number of learners possible and ensure their academic success. Finally, it must ensure that distance education materials and experiences are accessible to all learners regardless of their physical abilities or learning differences.

We turn now to one of the most critical elements in instructional design—high-quality content and materials.

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## References

Allen Interactions. (2022). *The successive approximations model*. Allen Interactions: https://www.alleninteractions.com/services/custom-learning/sam/elearning-development

Andrade, M., & Alden-Rivers, B. (2019, March). Developing a framework for sustainable growth of flexible learning opportunities. *Higher Education Pedagogies, 4*(1), 1–16. https://doi.org/10.1080/23752696.2018.1564879

Basham, J., Blackorby, J., Stahl, S., & Zhang, L. (2018). Universal design for learning because studnts are (the) variable. In K. Kennedy & R. Ferdig (Eds.), *Handbook of research of K12 online and blended learning* (2nd Ed., pp. 477-507). Carnegie Mellon University: ETC Press. https://www.learntechlib.org/p/182993/

BBC News. (2010, July 20). *Do typefaces really matter?* BBC News. https://www.bbc.com/news/magazine-10689931

Bureau of Internet Accessibility. (2021). *The definitive website accessibility checklist*. Bureau of Internet Accessibility. https://www.boia.org/website-accessibility-checklist

Burns, M. (2019a, February 15). *Yes, you should pilot your online course: A few things to consider as you do*. eLearning Industry. https://elearningindustry.com/pilot-your-online-course-things-consider.

Burns, M. (2019b, April 14). *To read or not to read: Text in an online world.* eLearning Industry. https://elearningindustry.com/text-in-an-online-world-read

Burns, M. (2019c, July 15). *Finding your type: Fonts and their influence on learning*. eLearning Industry. https://elearningindustry.com/fonts-influence-learning-finding-type

Burns, M. (2020, July 22). *Getting started with teaching online…again.* K-12 Talk. https://k-12talk.com/2020/07/22/getting-started-with-teaching-onlineagain/

Burns, M. (2021). *Background paper prepared for the 2023 Global education monitoring report, Technology and education: Technology in education.* United Nations Educational, Scientific and Cultural Organization. https://unesdoc.unesco.org/ark:/48223/pf0000378951

Bybee, R., Taylor, J., Gardner, A., Van Scotter, P., Powell, J., Westbrook, A., & Landes, N. (2006). The biological sciences curriculum study 5E instructional model: Origins and effectiveness. *The Biological Sciences Curriculum Study, 5*, 88-98.

Carey, B. (2011, April 18). Come on! I thought I knew that! *New York Times*. https://www.nytimes.com/2011/04/19/health/19mind.html

CAST, Inc. (2022). *The UDL guidelines*. CAST, Inc. https://udlguidelines.cast.org/

Chapman Alliance. (2010). *How long does it take to create learning?* Chapman Alliance. http://www.chapmanalliance.com/howlong/

Christina, R., & Louge, N. (2015). *Expanding access to early childhood development using interactive audio instruction.* The World Bank Group | Education Development Center: https://documents1.worldbank.org/curated/ru/743571468204574547/pdf/940100REVISED000ELP0WB0EDC0Feb02015.pdf

Costley, J., & Lange, C. (2017). The mediating effects of germane cognitive load on the relationship between instructional design and students' future behavioral intention. *Electronic Journal of e-Learning, 15*(2), 174–187. https://academic-publishing.org/index.php/ejel/article/view/1830/1793

Defelice, R. (2021, January 13). *How long does it take to develop training? New question, new answers*. Association for Talent Development. https://www.td.org/insights/how-long-does-it-take-to-develop-training-new-question-new-answers

Diemand-Yauman, C., Oppenheimer, D., & Vaughan, E. (2010). Fortune favors the bold and italicized: Effects of disfluency on educational outcomes. *Cognition, 118*(1), 111–115. doi:10.1016/j.cognition.2010.09.012

Dikkers, A. (2018). Social interaction in K–12 online learning. In K. Kennedy & R. Ferdig (Eds.), *Handbook of research of K12 online and blended learning* (2nd Ed., pp. 509–522). Carnegie Mellon University ETC Press. https://www.learntechlib.org/p/182993/

Elias, T. (2010). Universal instructional design principles for Moodle. *The International Review of Research in Open and Distributed Learning, 11*(2), 110–124. https://doi.org/10.19173/irrodl.v11i2.869

European Telecommunications Standards Institute. (2021). *Accessibility requirements for ICT products and services.* European Telecommunications Standards Institute. https://www.etsi.org/deliver/etsi_en/301500_301599/301549/03.02.01_60/en_301549v030201p.pdf

Fosnot, C.T. (Ed.). (1996). *Constructivism: Theory, perspectives, and practice.* Teachers College Press.

Gagné, R., & Briggs, L. (1974). *Principles of instructional design.* Holt, Rinehart & Winston.

General Services Administration. (2022). *Voluntary product accessibility template*. Section 508.gov. https://www.section508.gov/sell/vpat/

Herman, T., & Banister, S. (2007). Face-to-face versus online coursework: A comparison of learning outcomes and costs. *Contemporary Issues in Technology and Teacher Education, 7*(4), 318–326. https://www.learntechlib.org/primary/p/24250/

Hertz, B., Clemson, H., Hansen, D., Laurillard, D., Murray, M., Fernandes, L., . . . Rutkauskiene, D. (October, 2020). A pedagogical model to scale up effective teacher professional development: Findings from the Teacher Academy initiative of the European Commission. *EDEN conference proceedings: Enhancing the human experience of learning with technology: New challenges for research into digital, open, distance & networked education: 2020 research workshop* (pp. 227–237). European distance and e-learning network. doi:10.38069/edenconf-2020-rw-0025

Hope, A. (2006). *Factors for success in dual mode institutions.* Commonwealth of Learning. http://hdl.handle.net/11599/203

Hoxby, C. (2017). Online postsecondary education and labor productivity. In C. Hulten & V. Ramey (Eds.), *Education, skills, and technical change: implications for future US GDP growth* (pp. 401-460). University of Chicago Press.

Hultberg, P., Calonge, D., & Lee, A. (2018). Promoting long-lasting learning through instructional design. *Journal of the Scholarship of Teaching and Learning, 18*(3), 26–43. https://doi.org/10.14434/josotl.v18i3.23179

Interaction Design Foundation. (n.d.). *The basics of user experience design.* Interaction Design Foundation. https://www.interaction-design.org/ebook

Jung, I. (2000). Technology innovations and the development of distance education: Korean experience. *Open Learning: The Journal of Open, Distance and e-Learning, 15*(3), 217–231. https://doi.org/10.1080/713688402

Knowles, M. (1975). *Self-directed learning: A guide for learners and teachers.* Association Press.

Luschei, T., Dimyati, S., & Padmo, D. (2008). Maintaining e3-learning while transitioning to online instruction: The case of the Open University of Indonesia. *Distance Education, 29*(2), 165–174.

Mace, R. (2019). *Universal Design Principles*. Ronald L. Mace Universal Design Institute. https://www.udinstitute.org/principles

Mayer, R. (2009). *Multimedia learning* (2nd ed.). Cambridge University Press.

McAleavy, T., Hall-Chen, A., Horrocks, S., & Riggall, A. (2018). *Technology-supported professional development for teachers: Lessons from developing countries.* Education Development Trust. https://www.educationdevelopmenttrust.com/EducationDevelopmentTrust/files/34/3463d85a-031c-4f1e-9002-969b4daf4cdf.pdf

Molenda, M. (2015). In search of the elusive ADDIE model: Performance improvement. *Performance Improvement*, 54(2), 40-42. doi:10.1002/pfi.21461

Moon, B., Leach, J., & Stevens, M. (2005). *Designing open and distance learning for teacher education in Sub-Saharan Africa: A toolkit for educators and planners.* World Bank. http://oro.open.ac.uk/8401/1/teacher_education_toolkit_may13.pdf

National Eye Institute. (2019, June 26). *Causes of color blindness*. National Eye Institute. https://www.nei.nih.gov/learn-about-eye-health/eye-conditions-and-diseases/color-blindness/causes-color-blindness

National Research Council. (2000). *How people learn: Brain, mind, experience and school.* National Academies Press.

Quality Matters. (2019). *Course Design Rubric Standards* (6th ed.). https://www.qualitymatters.org/qa-resources/rubric-standards/higher-ed-rubric

Richmond, S., Burns, M., Boyle, H., Yasin, K., Christina, R., Cetina, A., & Faizullah, S. (2021). *Handbook for interactive audio instruction planning and implementing radio lessons in Sub-Saharan Africa.* UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000375330

Roediger III, H., & Butler, A. (2011). The critical role of retrieval practice in long-term retention. *Trends in Cognitive Sciences, 15*(1), 20–27. https://doi.org/10.1016/j.tics.2010.09.003

Rose, D., & Meyer, A. (2002). *Teaching every student in the digital age: Universal design for learning.* Association for Supervision and Curriculum Development.

Shift eLearning. (n.d.). *The Ins and outs of rapid prototyping for elearning*. https://www.shiftelearning.com/blog/rapid-prototyping-for-elearning

Skulmowski, A., & Xu, K. (2022). Understanding cognitive load in digital and online learning: A new perspective on extraneous cognitive load. *Educational Psychology Review, 34*, 1–26. https://doi.org/10.1007/s10648-021-09624-7

South African Institute for Distance Education. (2005, November). Costing distance education and open learning in Sub-Saharan Africa: A survey of policy and practice. *Open Learning: The Journal of Open and Distance Learning, 20*(3), 211–225.

Swan, K. (2006). Virtual interaction: Design factors affecting student satisfaction and perceived learning in asynchronous online courses. *Distance Education, 22*(2), 306–331. https://doi.org/10.1080/0158791010220208

Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science, 12*, 257–285. https://onlinelibrary.wiley.com/doi/epdf/10.1207/s15516709cog1202_4

Taflinger, R. (2011). *Taking advantage: Consumer psychology and advertising.* Kendall/Hunt Publishing Company.

Tennant, D. (2011, October 7). *16 pixels font size: For body copy. Anything less is a costly mistake*. Smashing Magazine. https://www.smashingmagazine.com/2011/10/16-pixels-body-copy-anything-less-costly-mistake/

Tucker, C. (2019, May 16). *Time estimates for elearning development*. Experiencing eLearning. https://www.christytuckerlearning.com/time-estimates-for-e-learning-development/

United Nations Department of Economic and Social Affairs. (2022, May 6). *Full text of the convention on the rights of persons with disabilities*. Convention on the Rights of Persons with Disabilities (CRPD). https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities.html

United Nations Educational, Scientic and Cultural Organization et al. (2016). *Education 2030: Incheon declaration and framework for action for the implementation of sustainable development goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.* UNESDOC Digital Library. https://unesdoc.unesco.org/ark:/48223/pf0000245656

United Nations Educational, Scientific and Cultural Organization. (2022). *The inclusion of learners with disabilities: Guidelines on emergency movement to online and distance learning.* UNESDOC Digital Library. https://unesdoc.unesco.org/ark:/48223/pf0000380661

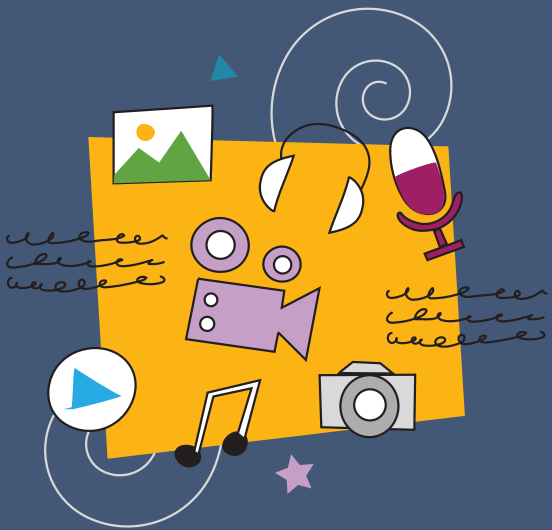
United States Department of Health and Human Services. (n.d.). *Accessibility training: Introduction to accessibility and section 508.* https://www.hhs.gov/sites/default/files/Intro%20to%20Accessibility%20and%20508.pdf

United States Department of Labor. (n.d.). *Consumer price index inflation calculator*. U.S. Bureau of Labor Statistics. https://www.bls.gov/data/inflation_calculator.htm

United States Equal Employment Opportunity Commission. (n.d.). *Fact sheet: Disability discrimination*. https://www.eeoc.gov/laws/guidance/fact-sheet-disability-discrimination

Wiggins, G., & McTighe, J. (2005). *Understanding by design* (2nd ed.). Association for Supervision and Curriculum Development.

World Wide Web Consortium (W3). (2021). *World wide web consortium (W3).* W3C Accessibility Guidelines (WCAG) 3.0. https://www.w3.org/TR/wcag-3.0/



Section II. Chapter 12

# DEVELOPING CONTENT

## Table of Contents

**Best Practice:** Successful distance learning programs must pay special attention to the appropriateness, quality, accessibility, and relevance of digital content.

## 12.1 Overview

Every educational experience—distance, blended, and in-person—can be reduced to its instructional core: teachers and learners interacting with academic content (City et al., 2009). As such, the type, quality, and amount of content often drive teaching and learning both in in-person and distance-based environments. This is particularly true in asynchronous online learning, which is often the dominant form of online learning and is highly content driven.

In many distance education programs, however, more effort may be focused on assuring high-speed Internet access or overseeing the distribution of radios than on developing high-quality learning materials. Yet careful attention to content should be as much a focus for distance education programs as technology has been. Poorly produced materials burden distance education courses; they confuse learners, require more instructor time, and support, and thus increase the cost and diminish the effectiveness of distance education. Because attrition rates for distance courses are high, materials must be well-developed, developmentally appropriate for the learner, accurate, stimulating, and positioned to take advantage of whatever particular technology modality is used. Where a choice of programs exists, those programs known for inferior quality will drive their potential customers (i.e., learners) elsewhere or out of the program altogether.

This chapter, a continuation of *Chapter 11: Instructional Design*, focuses on the four most common types of distance learning content: text/print, images, audio, and video. (Since multimedia is a combination of these elements, it is not examined separately.) While it touches on content within other modalities of distance education, it recognizes that online learning appropriates and makes use of all of these content types, and thus this chapter concentrates mainly on content as part of *online learning.*

## 12.2 What is Content?

For distance education courses, content—or "assets" as digital content is sometimes called—is any type of information with which learners are supposed to interact and through which they are expected to learn. Content can be print or digital and can comprise text, multimedia, simulations, animations, videos, lectures, presentations, tutorials, images, collections, links, resources, job aids (such as Frequently Asked Questions), worksheets, subject- and task-specific cognitive tools, references, assessments (quizzes, tests, exams), and readings.

Within distance courses, content generally has one of two roles or functions, as:

1. Curricular materials "intended to constitute a full, comprehensive course of study for a particular subject or topic" (Kaufman et al., 2020, p. 3). These curricular materials, instructional materials or instructional media may be a textbook in pre-service education, a teaching guide for in-service teacher professional development, or standards-based activities.

2. Wrap-around or support materials, which do *not* constitute a full course of study but often are purchased, adapted, or developed by instructors to "complement, supplement, and expand curricular materials or provide interventions" to learners who may require a "multitiered system of support" (Kaufman et al., 2020, p. 3; see also Gaspard-Richards, 2016).

The function or role of content as part of distance learning drives its selection, use, design, as well as the cost and time requirements to develop it.

## 12.3 Digital Content: Benefits and Limitations

Although print remains an attractive option for distance education providers, many distance and traditional teacher education programs have moved toward digital content. Many countries have selected digital textbooks over paper-based text, in particular for tablet platforms. It is common for textbook purchases to be augmented by online materials, such as video, three-dimensional (3D) environments, collaboration tools, augmented reality, multimedia, virtual worlds, applets, quizzes, tests and review materials, and special projects and lab work. Increasingly, textbooks contain QR codes that, when scanned, allow learners to view additional Web-based, multimedia content augmenting and vivifying textbook information.

Its growth notwithstanding, digital content suffers from a number of issues, among them the large capital costs associated with digital textbooks and possible interoperability issues between one platform and another. Chapter 1 summarizes the issues of reading from a screen: eye strain and difficulty navigating from one section to another, even on user-friendly e-readers and tablets. Chapter 4 highlights the "old wine in new skins" syndrome of a lot of digital content—traditional text in an expensive digital wrapper.

In spite of these limitations, however, digital content offers several long-term benefits for learners and for distance education programs:

- **Interactivity.** Unlike text, which has a flat structure, digital content can foster engaging, immersive, and interactive learning experiences. Text can be supported by audio, video, animation, and hyperlinks to Web-based content to provide a richer, multilayered experience for learners. (See Figure 2.3 in *Chapter 2: Audio-based Distance Education* for an explanation of "interactivity.")
- **Flexibility.** Digital materials can be connected to current research and thinking and then updated and disseminated more easily and inexpensively than is the case with textbooks.
- **Customizability.** Especially when combined with diagnostic assessment tools, digital content can provide a suite of personalized content for learners to help them address particular areas of weakness, or "hard spots." For example, instructional designers can use speech-to-text and text-to-speech software to help learners who may have reading and writing difficulties, thus providing automatic scaffolds and supports. Machine learning and ongoing formative assessment data can allow for further customization of content based on learner needs. Similarly, content can be easily updated to reflect changes in national curricula and standards. Web cookies can track a learner's browsing preferences, determining patterns of use so that content providers can then tailor content offerings to particular learners.
- **Multiple formats.** Digital content can be published in multiple formats: online, as an e-pub to read on a tablet device or e-reader, or as a Portable Document Format (PDF) that can be read on a computer screen. The content still can be printed in black-and-white or color to be read as a traditional paper-based book.
- **Accessibility.** Displaying content in multiple formats is particularly helpful for learners with special needs. Digital content, unlike its analog counterpart, can be made accessible—ensuring that learners regardless of physical conditions can access and use it. Digital content can be designed in openly accessible formats, such as

in accessible EPUB7, Text or Open Document Format Digital Accessible Information System (DAISY), or accessible PDFs (United Nations Educational, Scientific and Cultural Organization (UNESCO), 2022). We return to accessibility in the next section of this chapter.

- **Connected learning.** Digital textbooks enable the convergence of multiple teaching and learning components. For instance, particular content topics can be directly linked to national syllabi, video examples of the particular curriculum concept in action, teaching guides, or a supplementary audio lecture. Digital textbooks, if connected to a cellular network or the Internet, allow learners to communicate in real time about end-of-chapter discussion questions or curriculum topics. Study units can be self-contained, blending content with self-directed or collaborative instructional activities and assessment.
- **Price.** Digital content is paradoxical: It can be enormously expensive (think virtual reality systems and commercial ed tech content), yet at economies of scale, digital texts can be less expensive than paper-based texts and curriculum supplements. Low-cost digital content and open content, to be discussed later in this chapter, also can reduce the cost of content development (UNESCO, 2021).

Despite the above benefits, the reality remains that for many distance education programs the type of content they use and how it is used will not be dictated by desired learning outcomes or the learning benefits of particular types of content, but by the reality of their technical infrastructure and their finances. Because low-bandwidth environments are still pervasive, and because many distance programs often have modest budgets, these programs may end up simply scanning paper-based content and placing it online.

## 12.4 Developing Content for Distance Learning

Earlier we discussed content's two main functions—as a comprehensive course of study or as support materials. These sometimes competing functions in turn drive how content is developed and designed. They also drive the type of online learning—synchronous or asynchronous—and whether it is self-paced or cohort-based (Rapanta et al., 2020). Thus, the role of content and belief systems about how individuals learn, have impacts on insructional design—broadly resulting in two approaches to or models of online course development.

1. **The Content and Support Model.** This model supports the use of relatively fixed content that forms the core of the online course. It is typically for courses with no instructor or where instruction consists of the online instructor's tutorial support as requested (Mason, 1998, as cited in Gaspard-Richards, 2016, p. 2). This is most common in asynchronous or self-paced courses (Rapanta et al., 2020).
2. **The Wrap-Around Model or "50/50" Model.** This model is more common in synchronous or cohort-based courses where online interactions and activities may account for more of the learners' time in the online environment. In this 50/50 model, course materials and content "wrap around" and supplement learning via peer-based activities and instructor guidance (Mason, 1998, as cited in Gaspard-Richards, 2016).

Thus, the development of content is influenced by its function, the type of online course (asynchronous versus asynchronous), beliefs about how learning does and should occur, the instructional activities that drive that learning (self-paced versus learner-centered), available infrastructure (high versus low bandwidth) and the type of content available (print, audio, multimedia). Additionally, the rigor of content and alignment to educational standards influence learning. The magnitude of that influence, in turn, varies as a "function of the quality of these materials and how they are enacted by distance instructors" (Aguilar et al., 2022, p. 2). That is, in distance learning quality content matters—regardless of the many variables outlined above.

The remainder of this chapter examines the many types of content used in distance-based teacher education programs, offers general estimates about the cost and time required to develop digital content, and discusses how and from where distance programs can create and procure content.

Figure 12.1 begins the discussion with an instructive overview of the most common types of content found in distance courses, their learning benefits, considerations, and tools for use. While each content type can be examined as part of its overall modality (e.g., print-based instruction), it also is examined within the overall framework of online learning.

In addition to the suggestions in Figure 12.1, (see next page) all content must be designed to accommodate learners with physical impairments and learning differences. The degree to this actually occurs is often governed by the nature of digital materials created, the types of funding that distance programs receive, and the national or international rules and guidelines associated with such funding (e.g., U.S. Government or European Union funding). For instance, in addition to instructional design guidelines (discussed in the previous chapter), the European Union and UNESCO both have accessibility requirements for the development and use of digital content and software for programs they fund (European Telecommunications Standards Institute, 2021; UNESCO, 2022).

In the United States, the National Instructional Materials Accessibility Standard (NIMAS) stipulates that all U.S. textbooks be available as digital source files—that is, fully marked up Extensible Mark-up Language (XML) source files based on the Digital Accessible Information System (DAISY) international standard.[1] This way, the digital source file can be transferred to formats needed by learners with disabilities (e.g., a Braille book or digital talking book), and one piece of content then can be displayed in many different ways. The National Library Service for the Blind and Print Disabled produces a wide variety of materials on request for those who are blind, visually impaired, or have physical disabilities that limit their ability to use printed materials. Formats include audio, braille, and large print. Some are produced at no charge by volunteers, and others are produced for a fee (National Library Service for the Blind and Print Disabled, 2022).

Such considerations are not just pertinent to wealthy countries. For example, *eKitabu*, a Rwandan, Kenyan, and Malawian company, has taken on the task of developing and delivering accessible digital content and open-source software for learners in eastern Africa. Its *Studio KSL* integrates Kenyan Sign Language videos into digital children's storybooks featuring locally relevant stories and characters, packaged in the open standard EPUB format (UNESCO, 2020, p. 124). Across the globe, 110 countries are current signatories to the Marrakesh Treaty,[2] which allows for copyright exceptions to facilitate the creation of accessible versions of books and other copyrighted printed materials for visually impaired persons. The treaty requires that ratifying also make domestic copyright exceptions to allow for creating and sharing accessible print materials across borders (World Intellectual Property Organization, n.d.).

There are a number of resources to help those developing digital content ensure its accessibility. For example, the Voluntary Product Accessibility Template (VPAT) assists content designers by providing a list of the expectations for software and online systems that are Section 508-aligned (General Services Administration, 2022; United States Department of Health and Human Services, n.d.). The *Inclusive Learning Design*

[1] The DAISY consortium is an international association that develops, maintains, and promotes international DAISY standards. See: http://www.daisy.org/

[2] As of January 2023, the majority of 41 of signatory countries were in Europe, including the following countries outside the European Union: Russia, Moldova, Switzerland, Serbia, Belarus, San Marino, Bosnia-Herzegovina, Norway, Liechtenstein, Iceland, Montenegro, and Armenia. The remaining 69 come from all other regions of the globe (Euroblind, 2023).

**Figure 12.1**
**Main Content Elements in Distance Courses: Learning Benefits, Considerations, and Useful Tools**

### TEXT/PRINT

#### Learning Benefits

- Good for learning facts, ideas, and conceptual information
- Provides step-by-step instructions
- Offers guidance (in the form of hints, tips, checklists, cheat sheets and Frequently Asked Questions)

#### Considerations

- **Focus on writing.** Text and print should be clear, concise, and simple (Moon et al., 2005).
- **Make materials visually appealing, high quality, and stimulating.** Consider visuals, chunking, bulleting, listing text, and rule of three; ensure text is free from grammar, spelling, and punctuation errors; include suggested activities to stimulate engagement and participation (Burns, 2019).
- **Communicate content.** Present data clearly; make large data sets coherent; encourage the eye to compare different pieces of data; reveal the data at several levels of detail, from a broad overview to the fine structure; and closely integrate statistical and verbal descriptions of the data (Tufte, 2001).
- **Think about alternatives to text only.** For example, consider graphic novels (comic books), sketch notes, posters, or infographics to communicate information.
- **Producing and distributing content.**
  Pay attention to the quality of paper, color, visuals, binding, printing, copying, and distribution, avoiding damage to materials. If materials have additional supplemental content, distance education designers may wish to make them accessible via QR codes or place them online.

#### Useful Tools

- *Book Creator*
- *Canva*
- *ChatGPT*[3]
- *Genial.ly*
- Microsoft *Publisher*
- Microsoft *Word*
- Google *Documents*
- Google *Slides*
- *Moonbeam*
- *Piktochart*
- *Pixton* (comic book maker)
- Portable Document Files (PDFs)

### IMAGES

#### Learning Benefits

- Concise, powerful shorthand for communication.
- Not bound by language—their very imprecision renders them more evocative and open to subjective interpretation.
- Unlike text, the mind does not have to consciously recognize what the eye sees for an image to have an effect on the subconscious (Burns & Martinez, 2002; Taflinger, 2011).

[3] For more information on this AI-driven program, see these guides on *ChatGPT* developed by Dr. Torrey Trust, University of Massachusetts at Amherst https://tinyurl.com/av8b5zzm and by Nicole Zumpano, Director of Instructional Technology Coaching Learning Technology Center of Illinois https://tinyurl.com/25459c6k.

## Considerations

- **Select specific images to capture a feeling, spark curiosity, or summarize a message.** Carefully selected images can create an aesthetic feel, a mood, spark a learner's interest in the subject matter, and keep eyes on a website site longer (Burns, 2020a).
- **Use images to lighten the cognitive load.** Reading online—processing text-based information while simultaneously scrolling and moving between screens—increases an online learner's cognitive load. Images or graphics can lighten this cognitive load by drawing attention to specific content elements that the brain processes more easily (Burns, 2020a).
- **Select meaningful—not generic—images.** Users will linger over "real" images versus random "feel-good, decorative" stock images often used in online content (Nielsen, 2010, as cited in Burns, 2020a). Consider using images that are meaningful and relevant to online learners, and which represent a professional field (such as education) or that capture a theme—for example, for online math courses, images of people using real-world math, mathematical symbols, or great mathematicians.
- **Use images to teach.** Images are extraordinarily powerful teaching tools. In as little as 13 milliseconds, the human brain can process entire images (Trafton, 2014).
- **Teach learners how to "read" images as they would text.** Every image is composed of a structure (various elements such as color, objects, angles, light, etc.) and syntax (how these elements are organized) so that online learners develop visual literacy skills to complement other types of literacy (Burns, 2006).

## Useful Tools

- *Burst*
- *Canva*
- *Cleanup.pictures*
- *DALL-E 2*
- *Death to Stock*
- *Flickr*
- *Freepik*
- Google image search (also supports reverse image searches)
- *Icon Archive*
- *Illustrator*
- *Midjourney AI Artwork*
- *Noun Project*
- *Openclipart*
- *Open Peeps*
- Phone-camera tool for image editing
- *PhotoShop*
- *Pics4Learning*
- *Remove.bg*
- *Reshot*
- *Sketch.io*
- *Stable Diffusion*
- *Supermeme*
- *TinEye* (reverse image search)
- *Unsplash*
- Wikimedia *Commons*

## AUDIO

## Learning Benefits

- Audio can engage learners through stories, interviews, and narration (See Chapter 2), but also through other forms of the spoken word, music, and sound effects, which can make learning fun and provide learning cues.

## Considerations

- **Think about the type of course you're creating.** Audio, such as sounds indicating correct or incorrect answers, works well in gamified courses and creates a mood (anticipation, success, fun). Snippets of conversations can help users in simulations. Subtle background music may work in tutorials, voice-over narrations in explanatory videos, and sound effects in audio programs (Nielsen, n.d.).

- **Think about when *not* to use audio.** Beware of distracting audio, such as background music. To make sure audio doesn't interfere with learning, avoid audio when learners really need to focus. For example, background music that plays throughout an entire project is rarely a good fit because it tends to distract learners as they're trying to absorb the content—although it may work to use background music on the introductory slide to set the tone for the course, since learners aren't processing key information. For learners in rural areas, minimize or skip audio so it doesn't delay the time it takes to launch or move through the course (Nielsen, n.d.).
- **Provide learners with accessibility features.** Audio presents accessibility issues, so include close-captioned text. Captions and transcripts benefit learners with permanent disabilities, such as hearing loss, and situational disabilities, such as for those taking the course in a noisy place (like a school) (Nielsen, n.d.).
- **Pay attention to audio quality.** This is often overlooked in the design of digital content. In developing audio, keep the following three principles in mind.

1. **Maximize signal, minimize noise.**
   The signal is the audio content you want users to hear; the noise is everything else. Here is some advice:
   - Even a great microphone and audio editing software can't do much to fix poor original audio quality.
   - Keep microphones close to the speakers (12 inches from speaker's mouth for a unidirectional microphone). As distance is doubled, there's a commensurate drop in 6 decibels from signal to noise level—thus, the learner will hear more background noise than the intended signal (Engineering ToolBox, 2005).
   - Make sure audio is clear, and all narration and conversations are easy to hear and follow.
   - In recording whole-room sound (like a classroom), consider a ceiling microphone to cover the most space possible.
   - For a panel of experts, where it may be too costly to give everyone a directional microphone, place one 120-degree microphone between every two people.
2. **Research microphones.**
   - Get familiar with audio quality concepts such as polar patterns, reflections, reverberation, and resonance (See *Appendix 2: Glossary*).
   - Get to know microphones. While a simple audio recorder on your phone may suffice, a high-quality microphone makes a substantial difference.
   - Omnidirectional microphones pick up sound from all directions. They are good for capturing ambient noises or people talking wherever you don't have a specific or target audio source or when you need to capture a scene (such as a classroom).
   - Unidirectional microphones record audio from one direction (typically, the front), so it's usually the best type to use for audio narration or interviews (Tobias, 2016). For other types of microphones, see *Appendix 2: Glossary.*
3. **Make the recording space audio ready.**
   - Consider "acoustic separation" and acoustic treatments since all sound reflections, reverberations, and resonance will affect the signal-to-noise ratio.
   - Ensure that your recording space is audio-ready; if not, acoustically "treat" it before you record. For example, for glass walls, use double glazing; put carpets on bare floors; put wall finishes (e.g., tapestry) on two nonparallel walls.
   - It is easier to do these acoustic treatments up front versus relying on technical solutions after you have recorded.

### Useful Tools

Applications:
- *Audacity*
- *Beautiful Audio Editor*
- *FindSounds*
- *GarageBand*
- *Musgle*
- *TwistedWave*
- *Zapsplat*

Equipment:
- Microphone
- Phone-based audio recorder
- Pop filter to reduce popping sounds on "p" and "b" sounds
- Wind screen for reducing ambient noise

## VIDEO

### Learning Benefits

- Video can serve as stand-alone content (See Chapter 3) or as a component of an interactive eLearning course.

### Considerations

- **Tutorials/How-to Videos.** Screencasts allow instructors to demonstrate instructions or a process or how to use a technology tool instead of explaining it in writing. Using how-to videos also allows learners to jump to a specific point and rewatch important steps. Demonstrating the steps in a process gives visual cues and context to instructions, which helps avoid misunderstanding (Nielsen, 2022).
- **Lectures.** Lecture videos often are created when the instructor delivers live trainings that learners might not be able to attend. They also are an option for storytelling or presenting lengthy content in a more personable format, such as Ted Talks. Lecture videos can be recorded (via *Zoom*) and made available to all learners via a webcast on *YouTube* or in a learning management system (Nielsen, 2022). Research suggests that learners like seeing their instructors' faces included at various points in the video and say that such videos help them better retain information (Guo et al., 2014).
- **Interactive videos.** Interactive videos allow learners to check their understanding as they watch via quizzes, discussion questions, or notations (with an annotation tool such as *VideoAnt*).
- **Animations.** Computer animations can be 2D or 3D cartoons or vector drawings that show human stick figures or anthropomorphic objects to explain a concept or tell a story.
- **Whiteboard videos.** Whiteboard videos are a subset of explainer videos. They allow the presenter to tell a story or discuss a topic with fast-motion hand drawing accompanying visuals. Drawing while sharing a story can make the content more personal and emotional, which helps hold learners' attention (Nielsen, 2022).
- Research suggests the following:
  - Videos should be a maximum of six minutes in length and include the face of the person speaking. This suggested length continues to rapidly decline, so shorter is better.
  - Use Khan Academy-style tablet drawing tutorials versus *PowerPoint* slides or screencasts.
  - Video instructors should speak fairly fast with a high degree of enthusiasm (Guo et al., 2014, p. 2).
  - Given the importance of accessibility, video should come with close-captioned text.

### Useful Tools

Applications:
- Adobe *Premiere*
- Adobe *Spark*
- Articulate *Storyline*
- *Flip*
- *Movie Maker*
- *Replay 360*
- *Screencastify*
- *Screencast-O-Matic*
- *Vocaroo*
- *Vyond*
- *WeVideo*
- *YouTube*

Equipment:
- (Additional) microphone
- Video camera

*Handbook* (ILDH) is a free and open-source handbook designed to assist in the creation of adaptable and personalized educational resources to accommodate a range of learning needs (Flexible Learning for Open Education, n.d.).

### 12.4.1 Time and Cost Considerations

Numerous factors influence the time needed to develop content for distance courses. For example, securing accessible, relevant, accessible, high-quality content that addresses local education needs and is available in local or national languages may present formidable development challenges to many distance education systems. Well-designed distance education content and materials that promote higher-order thinking and critical reflection using rich multimedia—such as video, audio, and Web interactivity—also require more time, labor, and technical effort to develop.

It is difficult to identify exact amount time and cost for content development in distance courses because of the role, type, complexity, rigor, type of content model, and degree of interactivity of the content; the instructional design method deployed; the development tools used; and particularly, the skills and salaries of those involved in local content development. Thus, this section provides *estimates*—versus precise metrics—of potential time and costs associated with developing distance education content.

#### Time requirements

As discussed in the preceding chapter, developing a distance course for teacher training can be time-consuming. How time consuming generally depends on the interactivity of the content—more interactive content requires more development time than static content. In digital content development, unanticipated time-consuming problems abound. For example, an eLearning designer may spend hours (or days) trying to fix a trigger that is supposed to move the learner from one object to the next in a multimedia presentation but doesn't, or text in an eLearning branching scenario may be poorly formatted, forcing the designer to abandon the intuitive, object-oriented WYSIWIG user interface for the disorienting back end of HTML or XML code to find and fix the bug.

While Chapter 11 examined the time required to develop eLearning *courses* in their entirety, this section examines the time and cost of *content* development—viz. the constituent digital assets of an online *course*. Many factors influence the time and cost required in developing content. These include the following:

- heterogeneity of modes of distance education;
- types of content (print vs. multimedia);
- adherence to standards for content;
- content-related factors, such as purpose, interactivity, rigor, the user, the content model deployed (content and support model focused vs. wrap around model);
- designing for accessibility;
- size and skills of development teams; and,
- availability of local language content.

As this partial list of factors intimates, it is often challenging to determine the time needed to develop distance-based content by media types with any degree of precision. That said, Figures 12.2 (next page) examines the *estimated* times for content development per one "notional hour" of learning.

#### Cost requirements

The development of all distance education materials obviously comes with a cost. Even for analog content, like print, costs may include writing, editing, illustration, typesetting, printing, and distribution. The cost of printing can vary depending on the number of copies and the type of printing process used—digital printing is generally less expensive than offset printing, though the latter is generally used for large runs of textbooks (The InkTank, 2021). The cost of developing a print materials may be spread out over a longer period of time than developing digital materials.

**Figure 12.2**
**Time Needed to Design One Notional Hour of Learning Time for University Class (Swift, 1996, as cited in Butcher et al., 2014, pp. 6-7; Rumble & Litto, 2005)**

| Medium | Estimated Number of Development Hours (Minimum to Maximum Hours) |
|---|---|
| Audio | 20–100 |
| Multimedia (including simulations) | 20–300 |
| Print | 20–100 |
| Video | 50–200 |

Again, in terms of developing digital and analog content, it is difficult to pinpoint exact costs given the diversity of content, course objectives, content types, and the length and modality of a distance course. Figure 12.3 updates 1998 data to 2022 data regarding the *cost* of distance learning materials *per learning hour.*[4] It also compares these costs with the baseline cost of developing print materials—ratios also have been updated to reflect 2022 costs. Given widely diverging costs associated with salaries and materials and the presence or absence of content standards and quality assurance mechanisms, Figure 12.3 data are best interpreted as *approximations* that show relative costs of one digital content type to another versus precise and fixed amounts.

As Figures 12.2 and 12.3 suggest, print is obviously the least expensive type of content in terms of development costs and time. An hour of audio, for example, may be at least 28 times more expensive than an hour of print, while an hour of television-

**Figure 12.3**
**Cost of Distance Learning Materials in Relationship to Print (Per Student Learning Hour) (Huberman, 2000; U.S. Department of Labor, n.d.)**

| Content | Cost per Student Learning Hour in 2022 USD (All figures are rounded) | Ratio to Print Cost |
|---|---|---|
| Print (text) | $1,558 | 1:1 |
| Audio | $52,973 | 1:34 |
| Multimedia | $62,322 | 1:40 |
| Radio | $44,911 to $84,134 | 1:28 to 1:54 |
| Television | $280,447.31 to $389,510 | 1:180 to 1:250 |
| Video | $56,089 to $261,751 | 1:36 to 1:168 |

[4] Although not the most useful metric, one "notional hour" of learning is the standard by which course and content development are indexed.

based content may cost up to 250 times as much per hour of learning. Thus, there is still a strong financial imperative to use text and print as much as possible. Although not included in the above table, Movchan (2022) estimates that developing one hour of learning content for an online course can involve 100–160 hours of development time and cost approximately $24,009.34 (in 2022 prices).

Obviously then, the time and cost associated with developing digital content can disadvantage small distance-based teacher training programs and those in the Global South vis-à-vis larger programs and those located in the Global North. Many distance-based programs simply cannot afford to go beyond text or print and are forced to figure out ways to procure other types of digital content.

## 12.5 Strategies for Developing or Procuring Distance Learning Content

Besides time and money, course content development requires significant levels of academic, professional, editorial, design, media, and technology expertise, as well as rigorous mechanisms for quality assurance. As such, many distance programs may explore multiple avenues for content development and provision. This section itemizes the many ways in which distance education programs across the globe secure education content.

### 12.5.1 In-House Instructional Design Teams

An in-house instructional design team—that is, a design team that exists within a distance education program or institution—may be the most common way of developing digital content for university-based distance education programs, particularly open universities. Open universities in Indonesia, Hong Kong, the United Kingdom, India, and Pakistan, for example, have in-house development teams that create and curate their own course content (Latchem & Jung, 2010). Some programs develop content with the instructor in consultation with an instructional design team (See Chapter 11); others may develop courses independently of the instructor, especially where there is no instructor, as in (many) asynchronous and self-paced courses.

In-house content development is easier than ever with eLearning authoring tools (e.g., *Articulate360* or *H5P*), open-source platforms such as *Moodle*, online tools such as *Nearpod*, and the many Google *Chrome* extensions that enhance the interactivity of Google *Docs*. While Figure 12.1 discusses content elements for distance courses, online designers can create other types of digital content, such as interactive presentations (via *Pear Deck, Nearpod*); quizzes (using *Kahoot!*, *Gimkit, Quizlet Live* and *Quizizz);* and branching scenarios (with *Twine*, *Storyline*, *PowerPoint* software and Google *Forms*).

### 12.5.2 Instructor-Developed Content

Teachers and distance instructors typically develop their own content and materials—over 90 percent according to one survey of U.S. teachers (Kaufman et al., 2020). They often do develop their own distance education content, particularly for blended courses, independent of an instructional design team. They may self-publish content and materials; digitize print materials; remix or "mash up" existing digital and analog content; leverage open educational resources or freely accessible online content, such as *Gizmos* and *PhET* interactive simulations; link to external content; or co-develop content with peers (i.e., other instructors or their teacher-learners).

Many university and school-district-based distance courses may encourage instructors in content development via a number of strategies. They may pay stipends to current faculty for course development; they may hire existing faculty or outside course development experts to create content; they may provide instructors with instructional design mini-courses through a university's equivalent of a center for teaching and learning; and they may assign instructional design teams, as mentioned in the preceding point, to help instructors turn lectures into *PowerPoint* presentations and screencasts. Many distance education programs use all or a combination of these approaches.

As discussed in Chapter 5, Web 2.0 tools—such as *Buncee*, *Prezi*, *Mindomo*, or *Pear Deck*—allow for easier and more collaborative content creation by distance instructors. Using social media publishing sites such as *Scribd* or digital magazine-type tools such as *Flipboard*, educators can publish and distribute their own niche content. Simple collaborative tools such as Google *Apps for Education* (GAFE)[5] and the host of *Chrome*-based extensions[6] that power them make collaborative creation possible.[7] Online tools, such as data dashboards, print casting, and self-publishing platforms, have made content creation and dissemination far easier. Tools such as *Palantir* (formerly *Kimono Labs)* allow users to turn websites into personalized API feeds, which can be exported in JSON/CSV/RSS or even turned into a mobile app. The patterned structure of extracting data from a website makes it easy for end users to filter out data visually within a few minutes. Finally, more robust tools and content management systems such as *Drupal* facilitate the creation, management, display, and administration of Web-based content.

Instructor content development can be further enhanced by educator networks, such as those sponsored by the International Society for Technology in Education (ISTE[8]), as educators are often willing to share content with colleagues. Interest-based and local "micro-communities" can allow distance instructors and teacher educators to purchase, mash up, curate, and publish Web-based content for a class or community. Many distance programs encourage this creativity and sharing as a valuable source of content development.

Content developers, including distance instructors, also may want to look at some form of digital rights management to prevent or restrict users from using materials without permission. This can be done, for example, by adding watermarks to assets to validate ownership of the content, password protecting and restricting PDFs, and setting expiration dates on multimedia.

Where they do not currently do so, distance education programs may want to involve instructors in the actual design of digital content. It's far easier to teach with content that you have personally developed, and research points to the demonstrable benefits of involving instructors in the design of learning materials and content (Cadorath et al., 2002; Haßler et al., 2020; Paskevicius, 2021; Wolfenden et al., 2012). The simple act of drawing (a representation or procedure), for example, can increase the engagement, comprehension, and conceptual problem-solving abilities of the person drawing (Wu et al., 2020). However, designing the types of flexible assessments that will be mentioned in *Chapter 17: Assessing Distance Learners* adds more complexity to this task.

Helping instructors (and teacher-learners) become content developers (and instructional designers) is essential to digital fluency, technology integration, and fundamentally to being a teacher in the 21st century. But it requires its own separate instruction, ongoing professional development, and support for those with little or no prior experience in content development. Instructors and learners must be aware of what, if any, standards govern content development for their particular distance technology mode in their particular context, and they must understand the Web Content Accessibility Guidelines. Instructors must also know how to link those broad standards, and more discrete benchmarks,

[5] GAFE is a cloud-based learning platform allowing teachers and students to create a range of documents online and to share calendars and data to be accessed at home and at school on any device with Internet access.

[6] Extensions are small software programs that customize the browsing experience. They enable users to tailor *Chrome* functionality and behavior to individual needs or preferences. They are built on Web technologies such as HTML, JavaScript, and Cascading Style Sheets (CSS).

[7] For an extensive list of Google *Chrome* Extensions, visit Denise Henry-Orndorff's Periodic Table of Google *Chrome* Extensions: https://tinyurl.com/2dnm8m6j

[8] As of publication, the International Society for Technology in Education (ISTE) completed a merger with the Association for Supervision and Curriculum Development (ASCD). As of January 2023, ISTE still retains its name, but this may change. For more information, see https://tinyurl.com/32sjmvr2.

to the development of materials and learning experiences—particularly if instruction is to be learner-centered and focused on developing higher-order thinking skills. Quality control standards and mechanisms must be established to ensure the authenticity, veracity, and quality of content—and learners' understanding of content must then be assessed. Those who develop, repurpose, and adapt existing content for distance-based courses must be familiar with and abide by the scope of intellectual property, such as copyright, trademarks, Creative Commons, and fair use designations (Figure 12.6 explains the last two designations).

If instructors and learners are to develop content for distance-based courses, they must have some degree of design and production skills and know how to couple various instructional methods to promote rigorous interaction with and deeper learner understanding of content topics—the instructional core mentioned at the beginning of this chapter (City et al., 2009). EDC's *EdTech Leaders Online* (ETLO) program has been one of the few established professional development programs that offers instruction in developing online content and designing courses for Web-based professional development and virtual schools.

### 12.5.3 Universities and Institutions of Higher Education

Universities and teacher training colleges are often solicited in the development of distance-based content for teachers. The University of Cape Coast developed print-based content for Ghana's Untrained Teachers' Diploma in Basic Education program[9] (discussed in Chapter 1). The University of the West Indies online Open Campus uses content developed by instructional design teams and faculty at one of its four physical campuses—in Trinidad, Barbados, Antigua, or Jamaica—or from approximately 100 partner universities across the globe (B. Shirley, personal communication, July 18, 2022). In Guatemala, local university partners authored print-based books and workbooks for the national teacher upgrading scheme, Threshold for Teacher Change (Millennium Challenge Corporation, n.d.).

The Education University of Hong Kong creates professional development content for the majority of primary and secondary school teachers in Hong Kong, while the Chinese University of Hong Kong has furnished content and course work for Filipino teachers working in the Alternative Learning System (credit-recovery for primary- and secondary-level students who had dropped out but want to resume their education). Russia's state pedagogical institutes (in Moscow and Krasnoyarsk) created content-based pedagogical strategies for Russia's eLearning Support Program (2006–2012).[10] Albania's National Pedagogical Institute and the University of Tirana co-developed content and materials for Albania's distance education program.

One of the largest such education initiatives is EDULINK II-ACP-EU Cooperation Program in Higher Education sponsored by the European Union and the Secretariat of the Organization of African, Caribbean and Pacific States. It serves institutions of higher education (IHEs) in Angola, Barbados, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Chad, Comoros, Côte d'Ivoire, Cuba, Democratic Republic of the Congo, Dominican Republic, Ethiopia, Fiji, the Gambia, Ghana, Guyana, Haiti, Jamaica, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Niger, Nigeria, Papua New Guinea, Rwanda, São Tomé e Principé, Senegal, Seychelles, Sierra Leone, South Africa, Suriname, Tanzania, Trinidad & Tobago, Uganda, and Zimbabwe. Among other objectives, this initiative focuses on increased inter-institutional networking between IHEs, including institutions offering teacher training, degrees and diplomas, institutional

[9] The author was involved with this initiative in 2006 and 2008.
[10] The author was briefly involved with this program in 2006.

capacity building of ACP higher education institutions, and co-operation among universities to leverage academic quality (Organization of African, Caribbean and Pacific States, n.d.).

### 12.5.4 Local Education Organizations and Consultants

Some distance learning programs, such as the United Kingdom's Open University, are recognized for the excellent quality of their materials and media. Other national or regional entities may have no such content development capacity or may suffer from the chronic lack of human and financial resources needed to produce high-quality materials. Consequently, they may turn to a variety of local education actors to support content development or provision of appropriate content, including the following:

- **Schools and teacher consultants.** For the Millennium Challenge Corporation-funded, IREX implemented Training Educators for Excellence[11] project, much of the online content was developed by teachers at the Guivy Zaldastanishvili American Academy, a private high school in Tbilisi, Georgia. The face-to-face materials that were repurposed for the online courses were created by U.S.-based teachers.
- **National educational agencies, such as ministries of education or offices associated with a ministry of education.** México's Secretaría de Educación Pública creates content and materials for the *Telesecundaría* program. In Georgia, the Teacher Professional Development Center (TPDC), which is part of the Ministry of Education and Science, designs professional development activities and materials for teachers. In Guinea, l'Institut National de Recherche et Action Pédagogique worked with EDC to develop content for the IRI program *Sous le Fromager* (1998-2006).
- **Local education nonprofits.** In Costa Rica, the Omar Dengo Foundation, a private nonprofit educational organization, works with the Ministry of Public Education to develop materials and content for online learning programs.

### 12.5.5 Media Companies

Media companies, such as France's TV5, the United Kingdom's BBC, and the South Africa Broadcasting Corporation (SABC), have developed or shared content for French-language online courses in Côte d'Ivoire, the TV- and mobile-phone based English in Action (Bangladesh), and the radio-based English in Action (South Africa), respectively. In Brazil, the state of Amazonas media center develops content for the instructional television program *My Teacher on TV*. In Japan, NHK, Japan's national television station, runs the Creative Library, a free Web service that encourages educators to use and remix video, audio, and multimedia for educational purposes. In the United States and United Kingdom, the Corporation for Public Broadcasting (CPB) and the BBC both provide digital content and media used by early education centers and schools across their respective countries, such as PBS *Learning Media* in the U.S. The CPB also awards funding to locally owned and operated public media stations to develop new educational media, online tools, and other educational experiences that benefit students and teachers (Corporation for Public Broadcasting, 2020).

### 12.5.6 Distance Education Providers

Open universities and Massive Open Online Courses (MOOCs) are natural places to look for digital content. This is a common strategy among distance education institutions that serve small populations and that share some cultural, geographic, or historical connection that makes such cooperation beneficial.

The African Virtual University (AVU) has established the largest distance and eLearning network in over 27 countries in Sub-Saharan Africa. It offers 219 open educational modules, ranging from mathematics and science to teacher

[11] The author was involved in this project from 2016 to 2019.

education and ICT skills, and is available via a Creative Commons license and free of charge in English, French, and Portuguese (African Virtual University, 2013). Open education is discussed in the next section.

The Virtual University for Small States of the Commonwealth is a network initiated by and built on the support of ministers of education of developing small states. It shares the content it develops with all network members (Commonwealth of Learning, 2022).

Before its civil war, Syria's Virtual University broadcast distance-based courses from the United Kingdom's EDEXCEL, Ohio University, Heidelberg University, and the United Kingdom's Open University (Latchem & Jung, 2010). Such a practice allows a distance education entity to offer a greater variety of vetted and presumably quality content and courses and buys the institution time until it develops in-house course design teams. The potential drawbacks, however, are a lack of localized and locally generated content and the time and resources necessary for translation and localization.

The Massachusetts Institute of Technology (MIT), Harvard, and the University of California at Berkley provide content to one of the largest MOOCs: *edX*. A second MOOC consortium, *Coursera,* relies on content from the University of Michigan, Stanford University, Princeton University, the University of Pennsylvania, and other top-flight universities. *FutureLearn*, founded by the Open University of the United Kingdom, leverages content from its partners, which include numerous British, Irish, South African, Australian, and American universities, such as Australia's Monash University, Ireland's Trinity College Dublin, South Africa's Stellenbosch University, New Zealand's University of Waikato, and numerous non-university institutions, such as Amnesty International, the British Museum, the British Council, and the Lego Foundation.

Finally, as noted in Chapter 4, TESSA, a consortium of 15 open African universities and the United Kingdom's Open University, has developed open educational resources for teachers and teacher educators that have been disseminated throughout the African continent. Content was initially targeted to five subject areas—literacy, numeracy, social studies and the arts, life skills, and science—but has since expanded to include areas such as social emotional learning and teacher professional development modules. TESS India, also discussed in Chapter 4, makes content freely available to Indian teachers and teacher educators through the Open University platform but also through Indian state platforms and *YouTube* (F. Wolfenden, personal communication, October 12, 2022).

### 12.5.7 Government-Funded Implementing Agencies

Many international donor or aid agency education projects contract with implementing agencies or contractors to carry out the donor's education goals—and indeed most education initiatives offer some form of teacher professional development (Burns, 2020b). These implementing agencies deploy staff with educational expertise to create distance-based content or, in some cases, work with local eLearning designers to develop content. For the USAID-funded Connecting the Mekong to Education and Training (COMET) program, EDC, an implementing agency, developed three sets of online courses for university faculty from 11 institutions of higher education across Myanmar, Thailand, Laos, Cambodia, and Vietnam, as well as all course content. In Senegal, EDC provided its Work Ready Now curriculum to E-Jàng, the online learning platform housed in *Moodle* of Senegal's Ministry of Technical and Vocational Education and Training (TVET) (N. Nunn, personal communication, July 15, 2022).

Because these programs are funded by bilateral or multilateral aid agencies, the distance education entity typically does not bear the cost of this content development.

### 12.5.8 Signature Content

Many distance education entities may wish to avail themselves of an innovation that is well known, proprietary, or specialized (such as Understanding by Design, Read Right Now, Singapore Math, or cognitive coaching). Thus, these entities may turn to external providers to supply both digital content for online, blended, and face-to-face instruction for teachers and students. U.S-based educational nonprofits TERC and the Concord Consortium are known for the quality of their STEM content and educational initiatives, many of which include a teacher professional development component, such as Investigations in Number, Data, and Space (TERC, 2022).

A popular provider of digital content for teachers and students is Khan Academy, whose videos through its online platform have been leveraged by national ministries of education, regional educational entities, and foundations to improve both teacher and student learning. For instance, Khan Academy videos have been used for student and teacher education as part of the Lemann Foundation's Innovation in Schools Project in Brazil (2016) and with 206 teachers and over 2,300 students as part of the Sergio Paiz Andrade Foundation's (Funsepa) initiative in Sacatepéquez, Guatemala (2015) (Khan Academy, 2022).

This content, too, although developed by nonprofits or foundations, often has a cost. However, if the nonprofit is part of a government-, philanthropic-, or foundation-funded project, the distance education entity may not bear the full cost of this content. Often these nonprofits will share content with all partner teacher education institutions or schools as part of an externally funded program or research project, or the content may be subsidized by a government or foundation.

### 12.5.9 "Virtual Resource Pools" or Portals

Virtual resource pools are websites that function as unregulated supplemental curriculum marketplaces (Aguilar et al., 2022). They have exploded in popularity over the last decade, giving teachers access to an unprecedented quantity of materials to address their students' learning needs, make instruction more engaging, or to solve any number of other problems that may arise. The most well-known, and successful, example is *Teachers Pay Teachers*. Other sites include Amazon *Ignite* and *Pinterest*, where educational content can be bought and sold at low cost. Although commercial, these sites are considered a separate content category from "commercial content," discussed next, because of their crowdfunding nature—they are teacher created and teacher rated and focus more on supplemental or wrap-around materials, games, and worksheets than do large commercial providers. Although popular and low-cost, these sites, particularly *Teachers Pay Teachers*, have been indicted for their failure to vet content and ensure copyright and ownership and for what is often perceived as low-quality content (Harris et al., 2021; Schwartz, 2018).

Portals are Web-based repositories or clearinghouses of "e-resources" and "e-content" designed to provide one-stop shopping for teachers. Alternatively known as intranets, virtual learning environments, limited area search engines, or learning platforms, portals typically include instructional materials, lesson plans, worksheets, and even access to professional development via multimedia applications, online chats, or webcasts and webinars.
The provenance of portals is extremely diverse. They may be designed by media groups; technology vendors; ministries of education; regional, district, or state education agencies; or international agencies to support pre-service and in-service teacher learning. Examples of portals offering a broad range of resources, content, and supports include the *Times Education Supplement* (with resources for British and Australian teachers); *Teachnology*, a U.S.-based commercial site; *Portal Educativo* (Educational Portal), developed by the Organization of American States for teachers in Latin America and the Caribbean; and the European SchoolNet *Learning Resource Exchange* (a host of portals) for teachers across the European Union.

### 12.5.10 Commercial Content

Ed tech is a multibillion-dollar industry, and the number of "unicorns"—start-ups worth over $1 billion USD—has exploded to 30 (as of January 2023), collectively valued at $89 billion USD (Holon IQ, 2023). Companies such as Pearson, McGraw Hill, and Leya (for the Lusophone market) have long sold educational content and courses to institutions of higher education and K–12 (primary and secondary) schools (Burns et al., 2019).

Originally, distance course providers, such as MOOCs, relied on universities to create courses, but the number of non-commercial MOOCs is declining, while the involvement of large tech companies in content development, such as Google, Microsoft, Amazon, and Meta, is increasing (Shah, 2021). As of this writing, 39% of the new courses launched on *Coursera* in 2021 are not from universities but rather developed by for-profit providers (Shah, 2021).[12]

Many distance programs contract with local technology or ed tech companies for content development; others with large ed tech commercial providers. As an example of the latter, Paraguay, Perú, and México, for example, contracted with Microsoft, Amazon, and Google to develop educational platforms and content during the COVID-19 pandemic school lockdowns (Sistema de Información de Tendencias Educativas en América Latina, 2022). Contracting with external or commercial providers is certainly a convenient way to get ready-made content to distance courses, although not for all modes of distance education. Content-as-a-service allows distance educators to download the most up-to-date content annually or monthly for a licensing fee, fills an immediate need, and can enhance local instructors' and designers' skills and knowledge. Since many ed tech companies provide curriculum materials to schools, their teacher training services should incorporate how to select, design, and teach with such materials. Commercial content provides education systems with tested, high-end, engaging content—although, as discussed in *Chapter 6: Mobile Learning*, research by Meyer et al. (2021) makes clear that such content cannot be presumed to be academically appropriate or educationally valid.

Commercial educational content, although commonly used across the globe (mainly for students), is not without its flaws. Benkler (2008) indicts the failure of "market-based strategies to get materials in local languages to developing countries." For-profit ed tech companies and commercial content providers have been accused of harvesting student and teacher data, often without their knowledge or consent (Privacy International, 2020).

Criticisms of commercial educational content focus on the underlying economics of such an enterprise. When economies of industrial production require high up-front costs and low marginal costs, distance education producers—much like textbook producers in the United States—must focus on developing a few "superstars" and ensuring that everyone uses them regardless of their relevance and appropriateness to local contexts. The most pernicious problem associated with commercial educational content—especially high-quality content—is that it threatens to deepen the digital divide, favoring wealthy education systems that can purchase commercial content, such as personalized learning systems or virtual reality.

One way around this is via competitions. The Norwegian Ministry of Foreign Affairs, the Norwegian Agency for Development Cooperation (NORAD), the Norwegian University of Science and Technology, the United States Agency for International Development (USAID) All Children Reading initiative, and the Inter-agency Network

[12] In 2021, two of the biggest MOOC providers moved from nonprofit to for-profit status. *Coursera* became a publicly traded company, while *edX* was acquired by the public company 2U for $800 million and lost its nonprofit status (Shah, 2021).

for Education in Emergencies launched the competition EduApps4Syria to develop smartphone applications to help Syrian children learn to read and improve their psychosocial wellbeing. Seventy-eight technology companies entered, and five companies were chosen to develop these apps.[13]

### 12.5.11 Repurposed Content from Face-to-Face Courses

A penultimate option for content development for distance education involves the repurposing of face-to-face materials for distance education courses. Many readers may remember this from the early, frantic months of COVID-19 pandemic school lockdowns in spring 2020, when teachers were exhorted to "put classes online." This is quite a common source of content for distance learning courses—but one that is deceptively difficult because face-to-face content is designed for in-person learning while online content is designed for learning via technology. That said, however, the process of adapting content for online settings was for many teachers during COVID-19 pandemic school lockdowns a critical entrée into technology-based learning, online learning, instructional design, and alternative forms of teaching with and through technology.

Much face-to-face content can be transferred to distance-based courses, of course, but not all can or should be. For example, content that is designed as part of self-paced and asynchronous instruction must have extremely detailed directions; it must be error free (because a learner who gets stuck may just give up); and it must be simultaneously rigorous (so they learn) but not overly so (so learners get through on their own). This often leads to a developer's dilemma—wanting to create asynchronous materials that are rigorous and promote deep learning but fearful that doing so will involve a solo learner dropping out of an online course or skipping that unit.

**Figure 12.6**
**Creative Commons Versus Fair Use**

Copyright is the lawful right of an author, artist, composer, or other creator to control the use of his or her work by others. There are two options for distance education programs wishing to access the content of others: Creative Commons licensing and the fair use doctrine.

**Creative Commons** (CC) licenses are copyright licenses that provide a simple, standardized way to give the public permission to share and use a creative work—on conditions of the author's choice. Creative Commons is *an alternative copyright management tool* (Paskevicius, 2021). Its licenses offer creators a spectrum of choices between retaining all rights and relinquishing all rights (public domain), an approach called "Some Rights Reserved." CC is much more education friendly than the fair use doctrine that governs copyrighted content used for noncommercial educational purposes (Caswell et. al., 2008; Creative Commons, 2018).

**Fair use** can apply when copyrighted content is provided only to enrolled students under controlled conditions (such as user authentication). Fair use is evaluated on a case-by-case basis, and considers the purpose of the use, how much of the original work is used, the nature of the use—using more creative vs. factual content and how it impacts the market for the original work (United States Copyright Office, 2022). When that same course is shared openly online, however, fair use ceases to apply, and all content must then be cleared for copyright violations (Caswell et. al., 2008; Creative Commons, 2018).

To fully understand fair use, see the Code of Best Practices in Fair Use for Open Educational Resources.

There are content formats, such as Choiceboards[14] and HyperDocs,[15] that can be used both online

[13] Read more here: https://www.norad.no/eduapp4syria

[14] For an example of Choiceboards for teacher professional development, see teacher Arjana Blazic's website, https://traveloteacher.blogspot.com/. For a range of Choiceboards across subject areas, see https://www.smore.com/epxnd-digital-choice-boards.

[15] For an example of a HyperDoc see https://tinyurl.com/mtjvh2pf. For access to a range of free HyperDocs, visit https://hyperdocs.co/.

asynchronously and offline, as individual, or collaborative technology-enabled activities and that by offering choice, allow for varying degrees of rigor.

As discussed previously in Chapter 11, the practice of "putting it online" is one of the cardinal sins of designing for distance courses, yet for understandable reasons having to do with limited bandwidth, a lack of development expertise, and its low cost, such a practice is both long standing and endemic across many distance education programs (Herman & Banister, 2007). However, many online professional development programs, for example, are so text-focused that they become merely expensive books, with learners losing out on the multimodal and interactive potential of the online medium. This "old wine in new skins" paradigm persists when content and course developers fail to design specifically for the distance environment, fail to address the types of teaching and learning promoted by various modalities, and fail to make multimedia as interactive and multichannel as possible.

The final option for developing content for distance learning programs, discussed in the following section, is to use or repurpose open content and open courseware for distance-based courses.

## 12.6 Open Educational Content

Across the globe, numerous distance education providers turn to open educational resources (OERs) to gather content for various distance based courses. OERs include open-source software (OSS), OpenCourseWare (OCW), and open content, which includes all forms of digital and text-based "learning objects." Learning objects are digital materials that can be as small as an image or as large as an online course module. They can be reused and repurposed, broken into their constituent elements, and reassembled (Wiley, n.d.).

### 12.6.1 Types of Open Content

"Open content" generally refers to content that is created and licensed under a Creative Commons16 or other "open" license, allowing for free use as well as distribution, reuse, and adaptation. Creative Commons is not simply one license but a range of licenses depending on how content will be used and the levels of attributions desired by the original author. Figure 12.7 (next page ) explains the concept of "openness." The Open Educational Resources Commons serves as a clearinghouse for this content.

#### Open Educational Resources (OER)

OER are educational materials that are freely available, usually via the Web, for use and for modification. They are a way of sharing knowledge and expertise by making aspects of an institution's approach to teaching available to other academics and making the content of that teaching available to anyone with an interest in learning (University of Nottingham, n.d.).

OER has spawned a vast, cascading movement:

- **Open educational repositories**, such as *OER Commons, the CK-12 Foundation, OpenLearn, Lumen Learning, Saylor Academy*, and *MERLOT,* with thousands of free educational resources
- **Open content sites**, such as *Wikipedia*, where users are encouraged to create information
- **Open media sites** such as *Wikimedia* in Education and Wikimedia Commons, which support the creation of localized educational content, especially in underserved languages such as Basque or Quechua
- **Open education sites** such as *WikiEducator* and *Wikiversity*

The Mozilla *Drumbeat* project brings together interested parties across the globe to create online projects or products in whatever domain they choose. Individuals, too, may develop open

[16] For more information on Creative Commons, see *Appendix 2: Glossary* as well as http://creativecommons.org.

educational resources to be used by distance education programs.[17]

### OpenCourseWare (OCW)[18]

OER and open content sites often require designers to mix and match content to a distance curriculum. Thus, a particularly valuable resource for distance education providers is OpenCourseWare (OCW). OCW is open, modular, and flexible electronic course content and MOOCs, developed by Open Education Global, a group of 243 nonprofit education providers—including, for example, the Massachusetts Institute of Technology, the African Virtual University, Tecnológico de Monterrey (México), Delft University (Netherlands), and Fundação Getulio Vargas (Brazil)—that advocate for open education. As of this writing there are over 2,500 free online courses, mainly STEM-focused (Open Education Global, 2022).

Materials in OCW collections are not simply freely available—their reuse and adaptation are also encouraged. Many of these resources are licensed under a Creative Commons license allowing for distribution, remix, and reuse of materials.

**Figure 12.7**
**The Five Rs of "Open" in Open Content and OER**

The terms "open content" and "open educational resources" describe any copyrightable work (traditionally excluding software, which is described by other terms like "open source") that is either in the public domain or licensed in a manner that provides everyone with free and perpetual permission to engage in the 5R activities, as follows:

1. **Retain.** Make, own, and control a copy of the resource (e.g., download and keep your own copy)
2. **Revise.** Edit, adapt, and modify your copy of the resource (e.g., translate into another language)
3. **Remix.** Combine your original or revised copy of the resource with other existing material to create something new (e.g., make a mashup)
4. **Reuse.** Use the original, revised, or remixed copy of the resource publicly (e.g., on a website, in a presentation, in a class)
5. **Redistribute.** Share copies of the original, revised, or remixed copy of the resource with others (e.g., post a copy online or give one to a friend) (Wiley, n.d.)

### Open-Source Software (OSS)

OSS is software whose code is freely available so that other programmers can modify and customize it. It is identified by the type of license under which it is released. These licenses include the Apache 2.0 license, the Microsoft Public License, and the GNU General Public License.[19] Essentially, open-source licensing, like all open content and courseware, encourages a shared community approach to the development, extension, and patching of OSS. A common misconception is that all OSS, indeed all open content, is free. While this is usually true, it is not always the case. Hence the designation FLOSS—Free/Libre Open-Source Software.[20]

Examples of OSS include the open-source operating system *Linux*; the open-source Web browser *Firefox*; open content management systems such as *Drupal*; open social networking engines such as *Elgg; the open* learning management system *Moodle*; the Web conferencing tool *BigBlueButton*; the open office suite *LibreOffice* and the open-source Geographic Information Systems (GIS) platform, *QGIS*.

*Gitlab* is an open-source code repository and collaborative software development platform. Although not open source, *per se*, *Github* uses *Git*,

[17] As an example, see Stephen McDonald's app of Mayan glyphs: https://tinyurl.com/5n7khzua.

[18] The term "OpenCourseWare" appears to be changing, or possibly disappearing. Because it is so well known in the education community, it is used it here.

[19] The GNU General Public License (GNU GPL) is the most widely used free software license.

[20] Another common misconception about open-source technology is that it is completely open, can be freely read, and read and write in any data format. This is not so. Formula specifications, data models, and procedures that establish interoperability among programs and devices are called "open specifications" (PNG, RSS, and HTML are examples of open specifications).

an open-source version-control software that lets users make separate changes to webpages at the same time, and the vast majority of code available on *Github* is open source. The proliferation of app development software and collaborative authoring Web 2.0 applications (such as slideshow sharing sites like *SlideShare*, or *Google Earth*, where free geospatial data and images can be mashed up with text, images, and video and then freely distributed via .kml files) fuels the open and collaborative content creation movement.

Relative to other types of open content, the influence of OSS has been less noticeable in the area of educational software, most likely because of formidable development costs, required production skills, and the necessary combination of educational, storytelling, and technical expertise that may limit such efforts to commercial vendors.

### Open Textbooks

All of the above open-source products—OER, OCW, and OSS—are important for teacher education. Perhaps most important of all, since many teacher education programs are university-based and focused on a canon of knowledge, is the open textbook movement (Caswell et al., 2008). Even in countries where the open education movement has little foothold, the open textbook movement has proven to be extremely successful because it frees learners from paying hundreds or thousands of dollars for textbooks over the course of their university education.

*Creative Commons* sponsors an open textbook archive. *OpenStax* has created peer-reviewed, open- licensed textbooks, available in free digital formats, as low-cost in-print versions, and for Amazon's Kindle e-reader. *Flat World Knowledge* makes available open textbooks and content on its searchable website. Although instructors choose the textbook, learners choose the format, and it can be read free online and also purchased in hard-copy format for a negotiated affordable price. The *Open Textbook Library* makes over 1,000 mainly English-language textbooks available in complete portable files (e.g., PDF, EPUB).

Poland adopted openly licensed, publicly funded textbooks (both digital and print-based) for its entire national education system in 2014. Fiji adopted a national OER policy, OER repository, and open licensing for publicly funded educational materials and research. Brazil has set open licensing requirements for digital resources that come with textbooks the government purchases for the nation's schools, and the Ministry of Education is developing an OER repository. In South Africa, Siyavula and the Department of Basic Education (DBE) have collaborated to print and distribute copies of open math and science textbooks, workbooks, and teacher guides to government schools across the country (William and Flora Hewlett Foundation, 2019, p. 4). The European Network for Catalyzing Open Resources in Education (ENCORE+) promotes the adoption of OER in Europe through the development of a European OER ecosystem, including a sustainable collaboration model, an OER quality framework, and OER strategy guidelines for higher education and business (Pelletier et al., 2021, p. 26).

Since open textbooks are so fundamental to distance-based courses, Caswell et al. (2008) have long advocated that that OCW and open content developers create kits showing how to make open textbooks, so that development of content can be repurposed, and open licensing can allow for free, unambiguous translation and distribution. This has spawned zero degree movements—zero cost university degrees  ("Z degrees") and the Zero Textbook Cost movement in public community colleges in California, a movement that is gaining ground in part because of savings for university learners. In the U.S. state of North Dakota, an official state audit of its university system revealed that an initial US$107,250 investment in open education resources training to bring OER to universities yielded between US$1.3 and US$2.8 million in savings for learners (in 2022 USD) (Gallion, 2018; United States Department of Labor, n.d.).

### 12.6.2 Open Content for Distance Education

OERs are popular among distance education institutions for a number of reasons. They can allow distance courses to stretch their limited resources. They enable institutions to substitute expensive textbooks with free or low-cost content, thus reducing the cost of the course since content development is a major expense. They provide a stream of ready-made content to institutions with no content or content development expertise. They also can offer an attractive view of content—not as some externally developed masterpiece but as a creation that can be disaggregated into the parts of its whole and developed not by "experts," but by ordinary teachers and students. Finally, OERs may confer a certain "white hat" reputation or cachet on an institution—that it is magnanimously making its content freely available to all, or it is plugged into current educational trends.

Open content is particularly beneficial for distance education programs in the Global South that may lack the resources for content development. It also is beneficial in crisis and conflict settings where learning materials can be made available rapidly, at low cost, and adapted locally to specific target group needs (Dahya & Dryden-Peterson, 2017). For example, Childhood Education International offers a repository of open education resources in Arabic, French, and English for those working in refugee settings (Childhood Education International, n.d.) The USAID- and NORAD-funded *Global Digital Library* provides digital repositories of open books and games available to learners in the Global South in multiple languages.

Open content and OER, through programs such as TESSA, TESS India, OER4Schools, and Information and Communications Technologies Competency Framework for Teachers Open Educational Resources (ICT-CFT OERs), provide teachers in low-resource environments in Sub-Saharan Africa and India not only with teaching materials (although these are critical), but with the skills and confidence to design more engaging learning activities (Haßler et all., 2020; OER Commons, n.d.; Wolfenden et al., 2012). As mentioned previously, the *ICT-CFT OER Hub* contains collections of OER curated by UNESCO and partner countries. These are aligned to the UNESCO ICT Competency Framework for Teachers (CFT), which facilitates teachers' adapting content and designing lessons as part of a community of teachers from Djibouti, Guyana Kenya, Lebanon, Mozambique, Nigeria, the Philippines, Rwanda, South Africa, Togo, Tunisia, Turkey, Uganda, and Zimbabwe (OER Commons, n.d.).[21]

In addition, numerous efforts across the globe are helping teachers develop and design distance-based courses that capitalize on the affordances of OER. One such initiative is the Partnership for Open Distant Flexible Learning in the Pacific, a five-year project (2020–2025) funded by the New Zealand Ministry of Foreign Affairs and Trade. The Commonwealth of Learning (COL), together with the Pacific Centre for Flexible and Open Learning for Development (PACFOLD), is implementing the project in the nine Commonwealth countries in the Pacific—Fiji, Kiribati, Nauru, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu (Commonwealth of Learning, 2023).

As open content and open education have become increasingly mainstream, there are a number of universities that have helped educators create their own content. The United Kingdom's Open University hosts *OpenLearn*, which contains open classes, content, and tools for potential teachers and learners across the globe. The University of Nottingham's (UK) *Open Nottingham (U-Now)* makes available free and repurposeable tools so users can integrate them into their own courses.

[21] UNESCO's ICT CFT framework for teachers has been adopted by numerous countries across the globe. The *OER Creative Commons* platform established ICT-CFT resources and courses developed to help teachers use digital tools for teaching, both face-to-face and via distance. Visit https://tinyurl.com/v8bhbvzc and select a country's name to access that particular online course.

The Center for Open and Sustainable Learning and the *Connexions* project at Rice University (U.S.) have developed technologies that leverage open licenses and encourage users to build and share custom collections of open materials. The materials produced for OCW collections are meant to be used and reused by self-learners, students, and faculty alike (Caswell et al., 2008). The Carnegie Mellon *Open Learning Initiative* offers free online courses to learners anywhere. Even Microsoft, which famously resisted the open-source movement, now hosts a platform for open-source projects,[22] and the central Chinese government has initiated the open-source program *Red Flag Linux*.

However, OER still struggles with issues of scale, access, sustainability, quality, and management.[23] Yet changes are afoot. Content Addressable Resources for Education (CARE), although in its emergent phase, is a method to address such issues—in the higher education space, at least. Based on the concept of the distributed Web (dweb), it uses the Interplanetary File System (IPFS) to distribute OER in ways that circumvent being blocked or paywalled, so that OER can be connected with each other in an open resource "graph" or network, accessed through peer-based browsers such as *Beaker Browser* and cloned and edited by any user to create, repurpose, and share again (Downes, 2019).

## 12.7 Benefits and Limitations of Open Educational Content

As important as it is to getting digital content into the hands of distance education providers across the Global South, the open content movement—content, educational resources, software, and textbooks—is not without its limitations. These, along with its advantages, are outlined in Figure 12.8 (next page).

## 12.8 Developing Content: Final Considerations

Whichever of the above approaches, or combinations of approaches, is used, distance education entities should bear in mind the following considerations as they procure and/or develop distance-based content:

- All content and materials must be truthful, objective and factual. In an era of rampant social media disinformation and greater access to self-publishing, distance education programs—whether they be online courses, social networking sites or podcasts—have a moral obligation to ensure that all information that is delivered to teachers via these platforms is honest and reliable; derived from reputable, knowledgeable sources; that it deals with controversial topics in a fair, balanced and objective manner; and that it is free of bias. Distance programs may soon have a legal obligation, too—as the European Union's Digital Service Act ramps up its standardized rules for digital content. These include requirements for proactive and transparent approaches to content moderation and removal of misinformation (European Commission, n.d.).
- As emphasized throughout this guide, standards matter: Content and materials should be developed in accordance with the Principles for Digital Development and Digital Content Accessibility Standards outlined by the Web Content Accessibility Guidelines.
- Materials created must be guided by availability of other resources (e.g., assignments that require learners to use library reference materials are not helpful if there is no library).
- Learners must be able to engage with content in ways that lead them to draw conclusions for themselves or to learn by doing (Department of Basic Education, Republic of South Africa, n.d., p. 29).

[22] See https://opensource.microsoft.com/projects.

[23] For instance, many OER initiatives are government funded; the use of open content has not been as widespread as hoped, particularly during the COVID-19 pandemic; and commercial ed tech companies often threaten the very existence of OER through monetization, appropriation, blockage, or disabling (Downes, 2019).

**Figure 12.8**
**Advantages and Limitations of Open Education Content**

| Advantages | Limitations |
|---|---|
| • It is far less expensive to produce and distribute than proprietary materials. The costs outlined in Figures 12.2 and 12.3 would be far lower in the case of open content (see Butcher et al., 2014).<br>• Source code and materials can be modified, so it is readily available and usable.<br>• Teachers can adapt content to fit their classroom needs, thereby learning content creation and instructional design skills (Paskevicius, 2021).<br>• Equity of access is assured. There is no restriction of software to any type of technology or user interface, so it may be distributed via means other than the Internet.<br>• Poorer countries may benefit from an influx of creative and knowledgeable producers who don't focus efforts on markets and don't require exclusivity in outputs.<br>• It can allow for more culturally responsive and local-language content<br>• It can tap more contributors.<br>• It avoids pitfalls of trying to please large education districts with one standard product.<br>• It is capable of providing narrowly tailored, high-end learning objects that can be integrated differently by different teachers and learners, depending on needs, styles, and emphases.<br>• MERLOT, MIT's OCW Initiative, the United Kingdom's Open University's Open Content License, and other open-course content such as *Wikipedia* have made their way into all educational programs.<br>• It can be freely shared among institutions, regions, and nations, avoiding the need to "re-invent the wheel."<br>• Use of Web 2.0 tools—collaborationware—allows users to tailor, localize, and remix free content and disseminate it for teaching and learning purposes. | • Distance education entities may lack capacity for quality monitoring and assurance.<br>• Open content taken from elsewhere may mean that content does not conform to local standards.<br>• Despite efforts to create local-language content, most content is in English and other dominant or "colonial" languages (French, Portuguese, English, Spanish).<br>• There is abundant open content for some forms of distance education (such as online learning), and little to none for others (such as television).<br>• The "tragedy of the commons" phenomenon means there are issues of updating, maintenance, and improvement of resources if they're owned by everyone in general but no one in particular.<br>• Many countries may lack capacity to develop high-quality open education resources or maintain and update such resources.<br>• OER works better in collaborative environments and open systems of greater instructor-learner autonomy versus more tightly controlled educational environments where materials must be on a large scale with a predefined framework set by someone other than developers or teachers and learners.<br>• It is difficult to generate peer-produced materials: There is a commitment to a certain way of working, writing, and collaborative authorship.<br>• There is no shared, national model for university open textbook use.<br>• The gap between university faculty's willingness to use OER and their ability to use OER may be wide.<br>• Because OER is free, one sometimes "gets what you pay for"—quality and accuracy may be poor.<br>• OER may lack metadata, so the provenance of content (by whom, for whom, why, and how it was developed) may be lacking.<br>• Some open-source tools have high learning curves. |

- Digital content must be SCORM- and .xAPI-compliant, so it can be shared across LMSs and platforms.
- The complexity of content (and of digital formats) may be influenced by the purpose of teacher-education programs. Pre-service courses and initial training and upgrading courses may require more involved and complex content than a program that focuses on continuing education or enrichment for teachers (South African Institute for Distance Education, 2005).
- As much as possible, content should be in multimedia format to account for learners' cognitive differences and stimulate more long-term learning (Mayer, 2009).
- Ongoing support for using materials is a must. Programs with substantial learner support may not need to develop as large a range of self-study resources as programs with lower levels of support. A still-perennial mistake in the design stage of program development is devoting attention to materials development at the expense of well-thought-out strategies for support, assessment, and quality assurance (South African Institute for Distance Education, 2005).
- Distance education programs require reliable and sustainable strategies for ongoing investment in course materials design and development.
- Distance education entities should dedicate organizational resources and establish procedures related to content development, use, and revision; for example, developing or adapting established content standards, setting up learner and instructor review and feedback on content, facilitating and managing online interactivity related to learning objectives, and establishing a user guide and list of acceptable metadata or tags for digital library content (Commonwealth of Learning, 2008).
- Distance programs must help teachers understand how this content fits into the curriculum. This alignment and cohesion are critical, since instructional quality is stronger "when teachers use a standard curriculum of any type, rather than cobbling together materials from various sources" (Hill, 2020).

Finally, course content must be defined by what teachers do in teaching and learning contexts—not by what technical experts feel teachers *ought* to know about technology (Department of Basic Education, Republic of South Africa, n.d.). Thus, whether institutions create or purchase content for distance learning courses, these materials still must be evaluated for appropriateness, quality, fitness, and usability regarding the curriculum for teacher preparation or continuing professional development. Evaluating instructional digital materials can be a challenging task, since choices often seem endless, interoperability issues still abound, and products are constantly evolving. There may be no standards against which to evaluate content; the process may be new; and it may be difficult to find materials that match curriculum frameworks, local teacher training curricula, and local contextual realities. To address these issues, educational entities or programs can do the following:

- Develop checklists and rubrics to assess content for quality, rigor, and fitness. This can be done, for example, by developing content in line with local or international education standards, such as UNESCO's ICT Competency Framework, Principles for Digital Development, South Africa's Professional Development Framework for Digital Learning, the (U.S.) National Geographic Society geography standards, Learning Forward's Teacher Professional Development Standards, or the National Council of Teachers of Mathematics math standards.
- If working in the Global South, contract with content developers from the Global South, particularly from countries or regions where distance education programs recruit teachers.
- For technical aspects of digital content, use international standards, protocols, or checklists to assess digital materials, particularly to

ensure they are SCORM-compliant.[24] That way, if distance learner providers move from one LMS to another or one platform to another, the content will work across platforms and systems.[25]

- In the content selection process, encourage users—instructors and learners, as well as administrators and procurement personnel—to participate actively in the selection and testing of materials. In so doing, distance providers can ensure that the materials meet educational needs while also fitting within the local budget and infrastructure.
- If local standards for content are unavailable, compare content against international or national standards for content such as the Association for Educational Communications and Technology checklist for multimedia and digital content or the National Standards for Quality Online Learning.[26]

## 12.9 Conclusion

Each mode of distance education requires different content and a different range of production skills to exploit its unique features (Bates, 2021, p. 2). While the type of content designed and utilized will depend on the particular mode of distance education, the production value, quality, attractiveness, and relevance still matter. Effective distance learning materials—both digital and analog—must be developed by people with a high degree of knowledge about a particular topic (subject matter experts), who are aware of the skills, abilities, and culture of the pre-service and in-service teachers for whom they are producing the content, and by instructional designers who understand how people learn and how the design of digital content contributes to learning.

Digital content for distance learning requires content that is appropriate and relevant, that is visually attractive and meets high technical and production standards, that is accessible to all learners, and that is sufficiently engaging to advance the diverse aims of various courses by supporting instructional efforts to model good teaching and learning. These efforts require focusing on classrooms and schools; integrating theory and practice; linking to specific teacher assessment outcomes; explaining and modeling subject-specific pedagogy; and inculcating declarative, procedural, and conceptual knowledge about a particular topic.

[24] SCORM (Sharable Content Object Reference Model) is a set of technical standards for eLearning software products. SCORM defines how to create "sharable content objects" (SCOs) that can be reused in different systems and contexts and governs how online learning content and LMSs communicate with each other.

[25] There are far more technical content standards than discussed in this chapter. These include, for example, the Dublin Core Metadata Element Set, a set of 15 "core" elements for describing online content. For more information, see https://www.dublincore.org/

[26] See http://www.nsqol.org/

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## References


African Virtual University. (2013, August 4). *African Virtual University: Transforming Africa into a Global Knowledge Hub*. African Virtual University. https://www.afdb.org/fr/projects-and-operations/selected-projects/african-virtual-university-transforming-africa-into-a-global-knowledge-hub-88

Aguilar, S., Silver, D., Morgan, D., & Polikoff, M. (2022). Analyzing 500,000 TeachersPayTeachers.com Lesson Descriptions Shows Focus on K-5 and Lack of Common Core Alignment. *Computers and Education Open*, *3*. https://doi.org/10.1016/j.caeo.2022.100081

Bates, T. (2021). *12 Golden Principles for Effectively Using Learning Technologies: Still Relevant?* Tony Bates.com. https://www.tonybates.ca/2021/11/12/12-guiding-principles-for-teaching-with-technology-still-relevant/

Benkler, Y. (2008). Common wisdom: Peer production of educational materials. *Paper presented at 17th Annual Instructional Technology Institute at Utah State University.* Logan, UT.

Burns, M. (2006). A Thousand Words: Improving teachers' visual literacy skills. *Multimedia Schools*, *13*(1), 6-20.

Burns, M. (2019, April 14). To Read Or Not To Read: Text In An Online World. *eLearning Industry*. https://elearningindustry.com/text-in-an-online-world-read

Burns, M. (2020a, January 26). To Inform and Inspire: Images In Online Learning. *eLearning Industry*. https://elearningindustry.com/inform-and-inspire-with-images-in-online-learning

Burns, M. (2020b). From theory to use: Making educational research more usable and useful for practitioners. *Annual Review of Comparative Education 2019 International Perspectives on Education and Society*, *39*, 47-53. doi:https://doi.org/10.1108/S1479-3679202039

Burns, M., & Martinez, D. (2002, March). Visual imagery and the art of persuasion. *Learning and Leading with Technology*.

Burns, M., Santally, M., Halkhoree, R., Roopesh Sungkur, K., Juggurnath, B., & Banoor Rajabalee, Y. (2019, November). *ICTs in Secondary Education in Sub-Saharan Africa: Policies, Practices, Trends and Recommendations.* https://mastercardfdn.org/wp-content/uploads/2019/11/ICT-in-Secondary-Education.pdf

Butcher, N., Moore, A., & Hoosen, S. (2014). Harnessing OER to develop teachers: The Guyana experience. *Journal of Learning for Development*, *1*(2). https://files.eric.ed.gov/fulltext/EJ1106066.pdf

Cadorath, J., Harris, S., & Encinas, F. (2002). Open Learning. *Training for Distance Teaching through Distance Learning*, *17*(2), 139-152. https://doi.org/10.1080/02680510220146904

Caswell, T., Henson, S., Jensen, M., & Wiley, D. (2008, February). Open educational resources: Enabling universal education. *International Review of Research in Open and Distance Learning*, *9*(1).

Childhood Education International. (n.d.). *Open Educational Resources*. Childhood Education International. https://ceinternational1892.org/oers/

City, E., Elmore, R., Fiarman, S., & Tietel, L. (2009). *Instructional rounds in education.* Cambridge, MA: Harvard Educational Publishing Group.

Commonwealth of Learning. (2008). *Education for a digital world: Advice, guidelines and effective practice from around the globe.* Commonwealth of Learning. http://oasis.col.org/handle/11599/52

Commonwealth of Learning. (2022). *Virtual University for Small States of the Commonwealth*. https://vussc.col.org/

Commonwealth of Learning. (2023). *Pacific Centre for Flexible and Open Learning for Development (PACFOLD)*. Commonwealth of Learning. https://www.col.org/what-we-do/regional-support/pacfold/

Corporation for Public Broadcasting. (2020, January 14). *CPB awards nearly $1 million in innovation grants to develop new educational media for youth audiences.* Corporation for Public Broadcasting. https://www.cpb.org/pressroom/CPB-awards-nearly-1-million-innovation-grants-develop-new-educational-media-youth

Creative Commons. (2018, July 18). *What is the difference between fair use and CC?* Creative Commons.

Creative Commons. (n.d.). *About CC Licenses*. https://creativecommons.org/about/cclicenses/

Dahya, N., & Dryden-Peterson, S. (2017). Tracing pathways to higher education for refugees: the role of virtual support networks and mobile phones for women in refugee camps. *Comparative Education*, *53*(2), 284-301.

Department of Basic Education, Republic of South Africa. (n.d.). *Professional Development Framework for Digital Learning: Building educator competencies in facilitating learning with digital tools and resources.* https://www.education.gov.za/Portals/0/Documents/Publications/Digital%20Learning%20Framework.pdf

Downes, S. (2019). A Distributed Content Addressable Network for Open Educational Resources. *16th International Conference on Cognition and Exploratory Learning in Digital Age (CELDA).* Cagliari, Italy.

Engineering ToolBox. (2005). *Sound Propagation: The Inverse Square Law*. Engineering ToolBox. https://www.engineeringtoolbox.com/inverse-square-law-d_890.html

Euroblind. (2023). *The Marrakesh Treaty*. Euroblind. https://www.euroblind.org/campaigns-and-activities/current-campaigns/marrakesh-treaty

European Commission. (n.d.). *Europe fit for the Digital Age: new online rules for platforms*. European Commission. https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/digital-services-act-ensuring-safe-and-accountable-online-environment/europe-fit-digital-age-new-online-rules-platforms_en

European Telecommunications Standards Institute. (2021). *Accessibility requirements for ICT products and services.* European Telecommunications Standards Institute. https://www.etsi.org/deliver/etsi_en/301500_301599/301549/03.02.01_60/en_301549v030201p.pdf

Flexible Learning for Open Education. (n.d.). *FLOE Inclusive Learning Design Handbook*. Inclusive Learning Design Handbook. https://handbook.floeproject.org/

Gallion, J. C. 2018. *Performance audit report North Dakota university system open educational resources report No. NP-007-17.* Office of the State Auditor North Dakota University System Performance Audit. https://www.nd.gov/auditor/sites/www/files/documents/Reports/State/2018%20NDUS%20-%20Performance%20Audit%20-%20Open%20Educational%20Resources.pdf

Gaspard-Richards, D. (2016). *Effectiveness of Agile Design in Wrap-Around Content Development.* Commonwealth for Learning. http://hdl.handle.net/11599/2684

General Services Administration. (2022). *Voluntary Product Accessibility Template*. Section 508.gov. https://www.section508.gov/sell/vpat/

Guo, P., Kim, J., & Rubin, R. (2014). How video production affects student engagement: An empirical study of MOOC videos. *Proceedings of the first ACM conference on Learning@ scale conference*, (pp. 41-50). http://up.csail.mit.edu/other-pubs/las2014-pguo-engagement.pdf

Harris, L., Archambault, L., & Shelton, C. (2021). Issues of quality on Teachers Pay Teachers: An exploration of best-selling US history resources. *Journal of Research on Technology in Education,*, 1-19. https://doi.org/10.1080/15391523.2021.2014373

Haßler, B., Hennessy, S., & Hoffman, R. (2020). OER4Schools: Outcomes of a Sustained Professional Development Intervention in Sub-Saharan Africa. *Frontiers in Education*. doi:https://doi.org/10.3389/feduc.2020.00146

Herman, T., & Banister, S. (2007). Face-to-face versus online coursework: A comparison of learning outcomes and costs. *Contemporary Issues in Technology and Teacher Education, 7*(4), 318-326. https://www.learntechlib.org/primary/p/24250/.

Hill, H. (2020, February 21). *Teacher PD Gets a Bad Rap. But Two Approaches Do Work.* Education Week. https://www.edweek.org/leadership/opinion-teacher-pd-gets-a-bad-rap-but-two-approaches-do-work/2020/02

Holon IQ. (2023, January). *Global EdTech Unicorns*. Holon IQ. https://www.holoniq.com/edtech-unicorns

Kaufman, J., Doan, S., Tuma, A., Woo, A., Henry, D., & Lawrence, R. (2020). *How Instructional Materials Are Used and Supported in U.S. K–12 Classrooms: Findings from the 2019 American Instructional Resources Survey.* RAND.org. https://www.rand.org/pubs/research_reports/RRA134-1.html

Khan Academy. (2022). *Impact*. Khan Academy. https://www.khanacademy.org/about/impact

Latchem, C., & Jung, I. (2010). *Distance and blended learning in Asia.* Routledge.

Mayer, R. (2009). *Multimedia learning (2nd. ed.).* Cambridge, UK: Cambridge University Press.

Meyer, M., Zosh, J., McLaren, C., Robb, M., McCafferty, H., Michnick , R., . . . Radesky, J. (2021). How educational are “educational” apps for young children? App store content analysis using the Four Pillars of Learning framework. *Journal of Children and Media*. doi:DOI: 10.1080/17482798.2021.1882516

Millennium Challenge Corporation. (n.d.). *Guatemala Threshold Program: Investing in Guatemala.* https://www.mcc.gov/where-we-work/program/guatemala-threshold-program

Moon, B., Leach, J., & Stevens, M. (2005). *Designing open and distance learning for teacher education in Sub-Saharan Africa: A toolkit for educators and planners.* World Bank. http://oro.open.ac.uk/8401/1/teacher_education_toolkit_may13.pdf

Movchan, S. (2022). *How much does it cost to develop an online course?* Raccoon Gang. https://raccoongang.com/blog/how-much-does-it-cost-create-online-course/

National Library Service for the Blind and Print Disabled. (2022). *Directory of Producers of Accessible Reading Materials*. National Library Service for the Blind and Print Disabled. https://www.loc.gov/nls/resources/custom-books-transcription-services/

Nielsen, A. (2022, January 5). *6 Types of Video You Can Include in E-Learning.* eLearning Heroes. https://community.articulate.com/articles/how-to-pick-the-right-approach-to-creating-video-learning

Nielsen, A. (n.d.). *6 Things to Consider When Using Audio in E-Learning*. eLearning Heroes. https://community.articulate.com/articles/6-things-to-consider-when-using-audio-in-e-learning

OER Commons. (n.d.). *Open Education Resources for the ICT Competency Framework*. UNESCO ICT Competency Framework for Teachers, https://www.oercommons.org/hubs/UNESCO

Open Education Global. (2022). *Open Education Global*. https://www.oeglobal.org/

Organization of African, Caribbean and Pacific States. (n.d.). *EDULINK-ACP-EU Cooperation in Higher Education*. https://acpintraeumap.communicationpackage.com/projects/edulink-acp-eu-cooperation-in-higher-education/

Paskevicius, M. (2021). Educators as Content Creators in a Diverse Digital Media Landscape. *Journal of Interactive Media in Education, 1*, 18. http://doi.org/10.5334/jime.675

Pelletier, K., Brown, M., Brooks, D. C., McCormack, M., Reeves, J., Arbino, N., . . . Mondelli, V. (2021). *2021 EDUCAUSE Horizon Report: Teaching and Learning Edition.*https://library.educause.edu/-/media/files/library/2021/4/2021hrteachinglearning.pdf

Privacy International. (2020, April 24). *Open Letter to the Global EdTech Sector.* Schools and Covid-19. https://privacyinternational.org/news-analysis/3709/schools-and-covid-19

Rapanta, C., Botturi, L., Goodyear, P., Guàrdia, L., & Koole, M. (2020, October). Online university teaching during and after the Covid-19 crisis: Refocusing teacher presence and learning activity. *Postdigital science and education, 2*(3), 923-945. https://doi.org/10.1007/s42438-020-00155-y

Rumble, G., & Litto, F. (2005). Approaches to Funding. In C. McIntosh, & Z. Varoglu, *Perspectives on Distance Education: Lifelong Learning & Distance Higher Education* (pp. 33-50). Commonwealth of Learning and UNESCO Publishing. https://unesdoc.unesco.org/ark:/48223/pf0000141218

Schwartz, S. (2018, December 19). On 'Teachers Pay Teachers,' Some Sellers Are Profiting From Stolen Work. *Education Week*. https://www.edweek.org/policy-politics/on-teachers-pay-teachers-some-sellers-are-profiting-from-stolen-work/2018/12

Shah, D. (2021, December 28). A Decade of MOOCs: A Review of Stats and Trends for Large-Scale Online Courses in 2021. *EdSurge*. https://www.edsurge.com/news/2021-12-28-a-decade-of-moocs-a-review-of-stats-and-trends-for-large-scale-online-courses-in-2021

Sistema de Información de Tendencias Educativas en América Latina. (2022). *Sistematización de Respuestas de los sistemas educativas de América Latina de la Crisis de COVID-19.* SITEAL | IIPE. https://siteal.iiep.unesco.org/respuestas_educativas_covid_19

South African Institute for Distance Education. (2005, November). Costing distance education and open learning in Sub-Saharan Africa: A survey of policy and practice. *Open Learning: The Journal of Open and Distance Learning, 20*(3), 211-225.

Taflinger, R. (2011). *Taking Advantage: Consumer Psychology and Advertising.* Dubuque, Iowa: Kendall/Hunt Publishing Company.

TERC. (2022). *Projects and Investigations*. TERC. https://www.terc.edu/projects/investigations-center-for-curriculum-and-professional-development/

The InkTank. (2021, June 7). *Offset Printing vs. Digital Printing*. The InkTank. https://www.kaocollins.com/inktank/offset-vs-digital-printing/

The William and Flora Hewlett Foundation. (2019). *The Rich Global Landscape: An Overview of the Development of Open Educational Resources from 2002 To 2019.*

Tobias, T.K. (2016, August 16). *Microphone Polar Patterns*. Lewitt. https://www.lewitt-audio.com/blog/polar-patterns

Trafton, A. (2014, January 16). *In the blink of an eye.* Massachusetts Institute of Technology News. https://news.mit.edu/2014/in-the-blink-of-an-eye-0116

Tufte, E. (2001). *The Visual Display of Quantitative Information, 2nd Edition.* Cheshire, CT: Graphics Press.

United Nations Educational, Scientific and Cultural Organization. (2020). *Global education monitoring report 2020: Inclusion and education: All means all.* UNESDOC Digital Library. https://unesdoc.unesco.org/ark:/48223/pf0000373718

United Nations Educational, Scientific and Cultural Organization. (2021, June 10). *UNESCO's rapid teacher training on open, distance and online learning reaches 1400 teachers in Zimbabwe*. https://www.unesco.org/en/articles/unescos-rapid-teacher-training-open-distance-and-online-learning-reaches-1-400-teachers

United Nations Educational, Scientific and Cultural Organization. (2022). *The Inclusion of Learners with Disabilities: Guidelines on Emergency Movement to Online and Distance Learning.* UNESDOC Digital Library. https://unesdoc.unesco.org/ark:/48223/pf0000380661

United States Copyright Office. (2022, December). *U.S. Copyright Office Fair Use Index*. Copyright.gov. https://www.copyright.gov/fair-use/

United States Department of Health and Human Services. (n.d.). *Accessibility Training: Introduction to Accessibility and Section 508.* United States Department of Health and Human Services. https://www.hhs.gov/sites/default/files/Intro%20to%20Accessibility%20and%20508.pdf

United States Department of Labor. (n.d.). *Consumer Price Index Inflation Calculator*. U.S. Bureau of Labor Statistics. https://www.bls.gov/data/inflation_calculator.htm

University of Nottingham. (n.d.). *Open Nottingham*. University of Nottingham. https://www.nottingham.ac.uk/open/opennottingham.aspx

Wiley Publishing. (2020, May). *Academic Integrity in the Age of Online Learning.* John Wiley & Sons (Wiley). http://read.uberflip.com/i/1272071-academic-integrity-in-the-age-of-online-learning/0?

Wiley, D. (n.d.). *Defining the "Open" in Open Content and Open Educational Resources.* Published freely under a Creative Commons Attribution 4.0 license at http://opencontent.org/definition/.

Wolfenden, F., Buckler, A., & Keraro, F. (2012). OER adaptation and reuse across cultural contexts in contexts in Sub Saharan Africa: Lessons from TESSA (Teacher Education in Sub Saharan Africa). *Journal of Interactive Media in Education*. https://files.eric.ed.gov/fulltext/EJ976456.pdf

World Intellectual Property Organization. (n.d.). *World Intellectual Property Organization*. The Marrakesh Treaty. https://www.wipo.int/marrakesh_treaty/en/

Wu, S., Van Veen, B., & Rau, M. (2020). How drawing prompts can increase cognitive engagement in an active learning engineering course. *Journal of Engineering Education*, *109*(4), 723-742. doi:https://doi.org/10.1002/jee.20354

Section II. Chapter 13

# PREPARING DISTANCE INSTRUCTORS

## Table of Contents

**Best Practice:** Successful distance education programs provide high-quality preparation for distance learning instructors.

## 13.1 Overview

As many of the world's primary, secondary, and tertiary-level teachers discovered during the COVID-19 pandemic, "remote teaching"—teaching via distance—is a major paradigm shift. The world's teachers, many of whom were thrust into the role of a distance educator, had to learn how to use technology, teach through a particular distance model (e.g., a Web conferencing platform or Google *Classroom*), and figure out how to exhibit the learner-centered instructional approaches outlined in Chapter 10. Even those with more knowledge still found it difficult to integrate technology and pedagogy in ways that were engaging for students. For teachers without a strong knowledge of technology and online pedagogies, this was a steep learning curve. And teachers who had *never* used technology or learner-centered pedagogies faced the most difficult challenges of all (Burns, in press; Organisation for Economic Co-operation and Development [OECD], 2020). (Figure 13.1 discusses teacher adoption of online learning during the early months of remote learning in 2020.)

Good teaching is good teaching, regardless of the mode of instruction. Yet as many of the world's teachers, university instructors, and teacher educators discovered during the COVID-19 pandemic-related emergency remote teaching, teaching via technology requires an additional skill set, and every mode of distance education presents its own unique set of instructional challenges. Whether in traditional modes of distance education (print-based correspondence, radio, television) or newer ones (online, mobile, or multimedia-based distance education), distance instructors face a diverse and unique set of additional technology-based pedagogical challenges that require added professional development and support (Barbour, 2014; Cadorath et al., 2002; Myung et al., 2020).

This chapter argues that good distance instructors[1] matter, just as they do in face-to-face settings. The chapter focuses on the skills needed by two primary groups—*online instructors* teaching pre-and in-service teachers and *online teachers* of primary and secondary-level students. The following pages examine the current state of preparing instructors and teachers to teach online, and point to the need to prepare instructors to teach in the mode of distance education they will use.

## 13.2 What Skills Do Distance Instructors Need?

Well before COVID-19 emergency remote learning, Maor & Zariski in 2003 studied how Australian university faculty (lecturers) embraced online technologies and pedagogy. Through their research they developed a profile of instructors

[1] In this chapter and guide, an "instructor" teaches pre-or in-service teachers ("learners") whether in universities or distance-based professional development programs. A "teacher" teaches primary and secondary-level "students."

and the variation in their transition to online teaching. Maor & Zariski's profile is as resonant now as it was decades ago and consists of the following change types:

- Instructors who refuse to acknowledge the potential of eLearning as an interactive tool for teaching and learning, and therefore deliberately do not use technology as part of teacher training.
- Instructors who utilize constructivist approaches in face-to-face sessions but not in online learning (this type may form the largest set of online teaching adopters[2]).
- Instructors who embrace technology but do not change pedagogy to capitalize on the interactive potential of technology (this type is also a large group).
- Instructors who adopt online learning to match a social constructivist or learner-centered approach to teaching (this type tends to be a smaller group).

Those who work in teacher education will recognize the first three change types; less common is the fourth—because of the challenges involved. The above typology suggests that distance education instructors need an array of training and support particularly as they transition to online learning. Indeed, research suggests that preparation and professional development for those who are about to teach online require an assortment of skills related to teaching via technology. A discussion of these skills forms the bulk of this chapter.

**Figure 13.1**
**Instruction During "Emergency Remote Teaching"**

In spring 2020, the SARS-COVID-19 pandemic forced the shutdown of educational institutions across the globe. Perforce, education systems with strong technology infrastructure rapidly pivoted to "emergency remote teaching"—mostly online education, but often in its most reductionist form—as a content delivery system (Cobo et al., 2020; Pillow & Dusseault, 2020). Teachers uploaded assignments in Google *Classroom* or via a subscription education service. Students learned alone, with occasional check-ins and office hours with teachers via a Web-conferencing system. Relatively few students participated in sustained real-time instructional activities with their teachers or classmates (Burns, 2020). Where there was instruction, it was often in the form of a lecture—some live, most pre-recorded (Goldstein, 2020).

This use of online didactic approaches by teachers, many of whom employed learner-centered approaches in their in-person classrooms, resulted from the fact that across the globe relatively few teachers had received pre-pandemic technology training (OECD, 2020). Thus, they had to quickly decide which technologies to use and learn how to use them (Burns, 2021). This reality, combined with a lack of careful online course design, sidelined good pedagogy, and resulted in high degrees of learner dissatisfaction with and diminished academic performance in online classes (Burns, 2021; Halloran et al., 2021; Vidić et al., 2022).

But remote learning did offer countries the opportunity to rethink the importance of using low- and high-tech tools in sustainable and pedagogically sound ways. In Zimbabwe, UNESCO and the Ministry of Primary and Secondary Education (MoPSE) launched the Rapid Teacher Training on Open, Distance and Online Learning Programme. Some 1,400 teachers learned how to design online lessons and teaching content using low-tech tools such as *WhatsApp* and high-tech tools, such as learning management systems (LMSs), to deliver responsive and interactive remote learning to students (United Nations Educational, Scientific and Cultural Organization, 2021). Pandemic-inspired remote learning also offered the global community an opportunity to begin to envision what optimal distance learning should look like in action.

[2] This statement is based on author interviews with 100 teachers across 19 countries in 2020 and 2022.

### 13.2.1 Technology Skills

Distance education instructors should know how to use the technology platform through which they will teach, whether it's an MP3 player; a radio; a Web conferencing tool, such as *BigBlueButton*; a learning management system, such as *Blackboard*; an online classroom, such as Google *Classroom*; more independent Web 2.0 or SaaS tools, such as *Pear Deck* or *Nearpod*; or interactive audio or mixed reality. They should know how to create content and design activities for their mode of distance education. They should comprehend the benefits and challenges of these tools; know how to teach and assess using such tools; be able to manage the workflow associated with such tools (sharing resources, grading, and returning learner assignments); and be capable of troubleshooting or undertake the process for getting technical support (where it exists) for the inevitable issues that will arise. They also should know how to use the various apps that can enhance the functionality of these tools—both *Chrome* extensions3 and third-party apps such as *AnswerGarden* or *Mentimeter*.

### 13.2.2 Ability to Blend Pedagogy, Technology, and Content

Distance learning programs often struggle to find well-qualified instructors who understand how the intersection of technology, pedagogy, and content can provide meaningful learning experiences for distance learners.

Like any good teacher, distance education instructors must know their content and how to help learners master content in a distance environment. Often, assumptions prevail that all distance learning is a self-study process in which content is best understood via didactic materials and that learners can learn key content topics on their own simply by reading text or watching a video. In such an environment, distance instructors focus on communication, record-keeping, and administrative tasks.

Distance instructors need content mastery. But they need a range of other skills, too, including the ability to (1) use content-appropriate instructional strategies in a technology-mediated environment to help learners master the most important concepts of a particular discipline; (2) select the most appropriate technologies to produce effective discipline-based teaching with technology; (3) design instructional activities that capitalize on the affordances of a particular technology to promote content mastery (Shulman, 1986; Dawson & Dana, 2018; Akyol & Garrison, 2011; Baker, 2010; Barbour, 2014; Bawa, 2016; DiPietro et al., 2010; Mishra & Koehler, 2006; Burns, 2019).

Distance programs can assist instructors in integrating content, pedagogy, and technology—particularly for those designing synchronous and asynchronous online learning activities or blended distance environments—through the use of technology integration frameworks. These are operational procedures or scaffolds that serve a number of planning, implementation, and evaluative purposes. Technology integration frameworks furnish educators with guidelines and models for blending technology, curriculum, and instruction to facilitate meaningful integration in a systematic, evolutionary, and even "step-wise" fashion. They help operationalize what teaching and learning should look like under a certain set of proscribed conditions and establish a pathway for optimal integration, with markers that differentiate one level of integration from another (Burns, 2019).

Two of the most well-known technology integration frameworks are Technological Pedagogical Content Knowledge (TPACK) and the Substitution-Augmentation-Modification-Redefinition Framework (SAMR). Using these frameworks, instructors can leverage technology to not simply deliver content, pedagogy, and assessment but

[3] For a list of helpful *Chrome* extensions for online instructors, see: https://blog.curiosity.ai/8-must-have-chrome-extensions-for-remote-workers-in-2022-71bd4311dbec.

do so in thoughtful, structured ways that produce higher-level, discipline-based teaching (Mishra & Koehler, 2006; Puentedura, 2015).

### 13.2.3 Online Presence

In an online environment, the instructor plays a critical and multifaceted role. He or she is the "face" of what can be, for novices, a disembodied and potentially disorienting experience. Instructors must work to establish a welcoming presence, set a tone that encourages reflection and inquiry, broaden and deepen online communication, assess both individual and group learning and interactions, provide critical judgments and feedback about whether and how well participants are gaining content-specific knowledge, encourage those who fall behind in posting, know when and when not to intervene, and summarize participant learning.

"Presence" has three dimensions: *cognitive* (discussions of knowledge and procedures), *social* (emotional engagement among learners), and *instructional* (modeling effective pedagogical practices) (Rapanta et al., 2020; Rourke et al., 2001). Research confirms that strong and skilled facilitation of the knowledge, of the learning process, and of the social aspects of learning and helping learners become socially and academically integrated in the course is one of the most important factors in successful course completion and perceived learning (Akyol & Garrison, 2011; Burns, 2013; Dikkers, 2018; Gray & DiLoreto, 2016; Martin et al., 2020; Rapanta at al., 2020; Rourke et al., 2001). Presence assumes even greater importance when learners are accustomed to traditional, didactic learning environments and are new to online education.

Face-to-face instructors can create a sense of presence because they *are* physically present with their learners; presence is also easier in a synchronous online course (in *Zoom* or Google *Meet*). Where emotional, cognitive, and instructional presence becomes more challenging is in asynchronous courses, such as print-based correspondence courses or online courses via an LMS, where instructors are separated from their learners in space and time. This situation can be remedied by designing for frequent instructor-learner interactions and requiring instructors to respond to learners within 24 hours by text, voice, or email.

### 13.2.4 Effective Communication Skills

A critical component of presence is communication. There are typically two broad types of instructor-related communication in a traditional LMS-based course.

The first is online discussions, which are often the "ties that bind" a collection of individual learners into a collaborative learning community. Without such discussions, the learning opportunity becomes a solo endeavor, and opportunities for deeper learning are lost. The promotion of such collaborative communities through online discussion groups requires skilled facilitation by instructors who employ strategies that elicit learners' beliefs and understandings. These instructors recognize when and how to respond to individuals and to the group in order to shape and promote interaction. They guide participants along a continuum of learning from awareness of new techniques to adapting and applying such techniques in their own professional settings (Burns, 2010).

The second is instructor conversations with learners, both collectively and individually. To make the online environment feel like a conversation and foster a sense of belonging, facilitators must provide "verbal immediacy" and "just-in-time" assistance—frequent and meaningful communication from an instructor to online learners (Burns, 2010; Reupert et al., 2009). Baker (2010) found a statistically significant positive relationship between this verbal immediacy and presence, noting that the linear combination of the two is a statistically significant predictor of affective learning, cognition, motivation, and learner satisfaction with the online environment. Thus, verbal immediacy is a critical ingredient of good communication as well as of presence because an online instructor's response time can bridge the virtual distance between the instructor and learners—or deepen it.

### 13.2.5 Feedback

An important part of communication is feedback. Feedback has numerous benefits for adult learners as well as for the students they teach: It has a sizeable impact on learning outcomes and can actually deepen learning (Dobbie & Fryer, Jr., 2013; Jaquith & Stosich, 2019; Timperley et al., 2007). The quality and timeliness of an online instructor's feedback is the most valued form of learning connection identified by distance learners, and higher student achievement is positively linked with higher amounts of feedback to *teachers* (Dobbie & Fryer, Jr., 2013; Ragusa & Crampton, 2018). For example, one study of New York City charter schools reported that teachers at high-achieving middle (i.e., junior secondary) schools received more than twice the amount of feedback as teachers in schools not categorized as high-achieving (Dobbie & Fryer, Jr., 2013, p. 35).

Distance instructors can provide online learners with authentic opportunities and supports to provide meaningful feedback to one other. This is particularly important in teaching methods

**Figure 13.2**
**The Complexity of Feedback**

As educators, our belief in the necessity and utility of feedback is almost dogmatic. Yet the reality of feedback is far more complex. For instance, human beings can employ one of three reactions to feedback: They can accept it; modify it to fit their existing schema; or reject it outright. A good deal of research shows we routinely do the latter (Buckingham & Goodall, 2019). We get defensive and reject feedback, particularly when it comes from a source we do not consider credible. In the case of teachers, that might be a coach who has never taught or an online instructor whom teacher-learners consider to be unqualified (Burns, in press; Molloy et al., 2020).

Feedback appears to have more utility for people whose main motivation is self-improvement and when it is "developmental" versus "evaluative" (Blunden et al., 2019). Developmental feedback best achieves its purpose when it highlights and emphasizes the areas in which the recipient can improve and is forward looking, offering clear actionable steps and strategies for improvement (Buckingham & Goodall, 2019; Blunden et al., 2019). But even here, feedback seeking is only weakly related to performance, and employees often report that the feedback that they receive is unhelpful (Blunden et al., 2019).

The person delivering the feedback also can be problematic. Distance instructors, for example, may be reluctant to offer constructive criticism—they may not have been trained in how to do so. Both culture and their own personality may make critiques of others difficult for them (the "MUM" effect), especially if the teacher is a peer, and they may lack knowledge and skills about teaching and thus be unable to provide valid and actionable information. A lot of preparation focuses on the "how" of feedback—the communication skills needed to deliver feedback—but not the far more valuable "what" (Molloy et al., 2020). Many feedback techniques used by distance instructors, such as the "feedback sandwich," have been discredited by research (Henley & DiGennaro Reed, 2015).

A number of studies suggest better approaches to feedback. One is omitting it altogether. Doing so actually produced statistically significantly higher performance versus using the feedback sandwich in one study (Henley & DiGennaro Reed, 2015). A second is to dispense with feedback and instead encourage teachers to ask for "advice," which appears to better align improvement goals with information-seeking strategies (Blunden et al., 2019). A third approach, for teachers who must receive classroom observation feedback, is to use a critique-positive-positive, or CPP, sequence. Lastly, teachers and their distance instructors can focus on debriefing, which involves developing actionable items and a plan (Molloy et al., 2020).

courses or online professional development focusing on instructional or assessment practices. This performance feedback must be frequent, timely, explicit, detailed, and embedded within practice-based opportunities. A number of tools, such as *Mote* and *Kaizena*, can make this feedback easier in online environments.

A robust body of research has long advocated the importance of feedback. More recent research begs to differ with much of the conventional thinking on feedback as Figure 13.2 has outlined.

### 13.2.6 Ability to Manage Learners

For learners who have never been given the independence or flexibility to chart their own learning course, or who come from education systems that are top-down and directive, less structured forms of distance learning such as asynchronous online courses or immersive environments can be challenging. Distance learners, particularly novices, may have difficulty completing their work in such an open environment, particularly when they are not part of a place-bound physical cohort of other learners.

Distance instructors must devote time to assisting such learners by motivating them, counseling them, offering just-in-time support, monitoring their performance, providing one-on-one and differentiated tutoring, or just checking in (Cadorath et al., 2002; Dahya & Dryden-Peterson, 2017; Hennessy et al., 2022; Jukes et al., 2016; Liu et al., 2022; Martin et al., 2020; Mendenhall et al., 2017). This is particularly true for those learning online in refugee settings (Halkic & Arnold, 2019). Salmon (2011) advocates that learners receive support in all “phases” of the online course: the access and motivation phase, online socialization phase, information exchange phase, knowledge construction phase, and review phase.[4] The kind of supports will vary according to these phases; thus, distance instructors will have to be adept at knowing what supports to provide (emotional, social, academic), as well as when, why, and how. These supports will be examined through three distinct lenses in the next three chapters.

Although this notion of supporting and interacting with distance learners (again, in this guide that means teachers) has gained more traction in the international education development community specifically, and in teacher education more broadly, it is often not the norm in many established distance learning environments. This omission may be driven by cost or by the preference for asynchronous over synchronous or bichronous online courses (because of costs, time zone differences, and the absence of an instructor). It may result from a type of do-it-yourself ethos regarding adult learners. Or the distance instructor may not be provided with dedicated time to provide follow-up support. Some programs and platforms (such as MOOCs) have explored the use of Frequently Asked Questions (FAQs), videos or chatbots to provide at least some modicum of support (Lowenthal et al., 2018).

### 13.2.7 Same Aptitudes and Dispositions as Online Learners

Finally, distance instructors need many of the same aptitudes and dispositions that their online learners need. They must exhibit skills of self-direction and time management that enhance their efficacy as online instructors. They must understand the importance of, and be willing to provide, active facilitation and technology-mediated support; and they must be highly self-regulated so they are not just responsive instructors but proactive ones (Akyol & Garrison, 2011; Baker, 2010; Barbour, 2014; Bawa, 2016; DiPietro et al., 2010).

[4] “Phase” is the term used, though online courses don’t necessarily proceed in the stepwise fashion this term suggests.

## 13.3 Standards for Online Teaching

Chapter 8 emphasizes the importance of good teaching and Chapter 9 the criticality of quality professional development. For these reasons, all distance education programs must make sure to develop *minimum competency standards* for distance instructors to guide the training and support they receive, so that these distance instructors can in turn provide the high-quality instruction, outlined in Chapter 10, to future and present teachers.

**Figure 13.3**
**Standards for Online Teaching**

National and international standards confirm the importance of quality online instruction. Though they typically share commonalities, each set of standards may put forth its own determination of what constitutes effective online instruction. Readers wishing to develop standards for their online programs have an abundance of exemplars to choose from, as the following sample suggests:

1. The Abu Dhabi Centre for Vocational Education and Training Virtual Teaching Standard
2. The European Union's Digital Competence Framework for Citizens
3. The International Association for K-12 Online Learning (now the Aurora Institute) National Standards for Quality Online Teaching (United States)
4. International Society for Technology in Education's Standards: Educators (US and international)
5. The Inter-agency Network for Education in Emergencies Minimum Standards Handbook (2012) concentrates primarily on in-person education with some focus on distance education (refugee and education in emergencies).
6. The United Kingdom's Teaching Excellence Framework
7. UNESCO's ICT Competency Framework for Teachers, mentioned previously in this guide, focuses on technology skills writ large (international).

For those establishing teacher-facing online programs, two sets of standards may be particularly helpful.

1. The Teacher Educator Technology Competencies (TETCs) reflects the recommendation of the 2017 U.S. National Educational Technology Plan to establish a common set of technology competencies specifically for teacher educators who prepare teacher candidates to teach with technology. The TETCs define 12 competencies (knowledge, skills, and attitudes) required of all teacher educators in order to support teacher candidates as they prepare to become technology-using teachers (American Association of Colleges of Education, 2022).
2. The National Standards for Quality Online Teaching provides the online and blended learning education community with an updated set of openly licensed standards to help evaluate and improve online teaching. These standards are accompanied by indicators and examples and are organized into the following eight standard categories:

   Standard A. Professional Responsibilities
   Standard B. Digital Pedagogy
   Standard C. Community Building
   Standard D. Learner Engagement
   Standard E. Digital Citizenship
   Standard F. Diverse Instruction
   Standard G. Assessment and Measurement
   Standard H. Instructional Design

(Quality Matters, Virtual Learning Leadership Alliance, and Digital Learning Collaborative, 2022)

There are any number of standards for quality online instruction that distance education programs can adapt or modify, as Figure 13.3 outlines. These standards frame and guide the particular skills that distance instructors should embody (United Nationals Educational, Scientific and Cultural Organization, 2018). While they all differ, these standards generally emphasize the following online instructor competencies: learning how to teach in the particular mode of distance education; differentiating instruction and support to learners according to their needs, skills, and professional context; becoming conversant with online instructional teaching standards; creating quality assessments that capitalize on the benefits of the particular technology; and grading and administrative procedures, particularly within an LMS.

## 13.4 Learning to Teach Online: How Are Online Instructors and Teachers Prepared?

Despite the presence of multiple versions of online teaching standards and the documented skills instructors need in order to teach well via distance—particularly online—distance learning programs have often struggled to find instructors who know how to adapt the instructional practices and pedagogical techniques used in face-to-face settings to an online environment (Barbour, 2014). This situation arises from two prevalent practices.

First, distance instructors are often recruited from face-to-face settings. Being a good *in-person* instructor, however, does not mean one will be a good online instructor (Blomeyer, 2007, as cited in Barbour, 2014). In fact, research suggests it can be an impediment, particularly if online instructors have a low level of understanding of the way online learners learn. Even if these instructors are adept at teaching *with* technology it does not mean they are equally facile teaching *via* technology (Burns, 2021). Faculty may be invited to teach or design online courses, with minimal or no exposure to the pedagogical aspects of online environments. They may work under the erroneous assumption that what works for in-person learning will always work equally well online (Bawa, 2016; Lowenthal et al., 2018; Reid & Kleinhenz, 2015).

Second, as will be discussed at length below, most distance education instructors across the globe have been given little or no preparation in the distance mode in which they will be teaching—synchronous webinars, bichronous LMS, MOOCs, or virtual school-based courses, particularly in the "signature pedagogies" associated with each[5] (Myung et al., 2020; Barbour, 2014; Shulman, 2005). Interactive audio instruction (IAI) and instructional television programs, discussed in Chapters 2 and 3, often provide teaching guides at least, and in-person teacher professional development is a salient element of the IAI approach.

The biggest omission in terms of instructor preparation appears to occur with online learning both for online instructors teaching pre-service and in-service teachers and online teachers instructing primary and secondary age students. This omission is further complicated by the lack of data collection and record keeping on the preparation of online instructors and online teachers. That lack of preparation—and its attendant data gap—are the focus of this section.

### 13.4.1 Brick-and-Mortar Pre-Service Programs

During the COVID-19 pandemic school lockdowns, university instructors and teachers across the globe experienced a baptism of fire in learning to teach online (Anand & Lall, 2021; Burns, 2020; Burns, in press; Pota et al., 2021). The exact number of university instructors and teachers who *were* prepared to teach online prior to the 2020 COVID-19 pandemic is unknown (Archambault et

[5] See *Chapter 10: Instruction* for a discussion of signature pedagogies.

al., 2016). Even within wealthy contexts, such as the United States, where technology standards have long exhorted online teaching preparation, this "data gap" regarding the preparation and professional development of online instructors persists (Archambault et al., 2016; Barbour, 2014; Dawson & Dana, 2018; Lowenthal et al., 2018). To wit: The National Council on Teacher Quality, a think tank that evaluates American teacher preparation programs, does not collect data related to online education (Koenig, 2020).

Data that do exist, also from the United States, suggest that preparation to teach online is minimal (Archambault et al., 2016; Barbour, 2014). Garrett et al. (2021) state that prior to spring 2020, 54% of 338 four-year public universities surveyed offered faculty development in online teaching, 59% in online course design, 64% in LMS/technology training, and 55% in quality assurance for online learning. While these percentages seem impressive, these were all optional courses, and the percentages listed here do not mean instructors actually took part in them—just that these courses were offered. Since then, and since the COVID-19 pandemic, numbers have increased among this sample of 338 institutions of higher education with 63% of public two-year institutions, 36% of four-year public universities, and 56% of private four-year universities now *requiring* training in online teaching (Garrett et al., 2021, p. 42).

However, the above data refer to a tiny subset of U.S. universities. While the upward trend in preparing instructors to teach online in these institutions is salutary, it is not clear whether or not this small sample of higher education institutions is representative or unique.

Other research suggests that educational institutions have been remiss in preparing instructors to teach online; rather, their emphasis has been on rapidly developing and deploying online courses "to increase enrollment, versus creat(ing) a body of well-trained faculty to boost retention" (Bawa, 2016, p. 6; Lowenthal et al., 2018). This is unfortunate because, as Chapter 8 emphasizes, good teachers are critical for student achievement—and as the next chapter will discuss, learner success in online courses is linked to their perceptions of the quality of online instructors. These interactions may have a much larger effect on satisfaction and perceived learning than interaction with peers (Reupert et al., 2009; Shea et al., 2004; Swan, 2006).

In terms of preparing *pre-service teachers* how to teach online, Archambault et al. (2016) report that only 1%-2% of brick-and-mortar higher education institutions do so.

### 13.4.2 Fully Online Universities

We might surmise that this lack of preparation to teach online would be completely different in fully online pre-service teacher education programs, though this is a pool that is quite small. In the U.S., only 4.9% of all fulltime online tertiary students major in education (2015–2016 data) (National Center for Education Statistics, 2019, p. 52).

There have been a number of early pioneers in the development of online teacher education programs—Iowa State University, the University of Florida, University of Virginia, and Graceland University are examples. Yet the data gap persists here as well. Most *fully online* teacher education programs that prepare teacher candidates *online* prepare them to teach in *brick-and-mortar schools*; thus the degree to which these online teaching candidates learn how to teach online is unknown (Koenig, 2020). Additionally, the degree to which these *online instructors* of *online* pre-service teachers in these *online institutions* are prepared and certified to *teach online* is also unknown (Archambault & Kennedy, 2018; Lowenthal et al., 2018).

### 13.4.3 Virtual Schools

As we've seen thus far, most in-person and online teacher preparation programs focus, not on preparing pre-service teachers to teach in online environments, but in brick-and-mortar ones. Further, data are unclear on what percentage of pre-service teacher programs prepare candidates to teach students (children and adolescents) *online*—though we do know the total has traditionally been very low (Archambault et al., 2016; Barbour, 2014; Dawley et al., 2010).

Not every teacher who matriculates through an online university or who takes a course in online teaching will end up teaching online—or even want to. Yet in places like the United States, where the number of "virtual schools" has increased dramatically from pre-COVID-19 pandemic levels, so too has the number of full time online teachers in these online or virtual schools (Diliberti & Schwartz, 2021) (For a fuller understanding of online or virtual schools, see Figure 13.4.). This growth should at the very least focus greater awareness on the percentage of virtual school teachers who have been prepared to teach online.

However, as with the preparation of online instructors, exact data on the number of *virtual school teachers* prepared to teach students online are hard to come by (Koenig, 2020; Dikkers, 2018). Most U.S. states thus far have *not* required a separate credential for these online teachers, even though many are full-time teachers whose online schools receive government funding.

Further complicating this poor accounting is the highly decentralized nature of the U.S. education system and the heterogeneity of virtual schools, as seen in Figure 13.4. Requirements for certification to teach online vary by each of the 50 states and even by individual virtual schools. Layered onto this complexity is the fact that each state or district may regulate its virtual schools differently depending on the *type* of virtual school (e.g., religious, independent, state public, charter, for-profit, not for profit, etc.) (Digital Learning Collaborative, 2020).

Data that exist suggest that a majority of *virtual school teachers* in the United States report feeling "undertrained" in online instruction when they begin teaching online (Berry, 2017, p. 37). In a 2010 survey of 830 American teachers teaching in a variety of online programs (from fulltime to supplemental) only 25% of "brand new online teachers" reported receiving some college or university training at all to teach online (Dawley et al., 2010).

**Figure 13.4**
**Types of Kindergarten–Grade 12 Virtual Schools**

Virtual schools are online primary and secondary schools (mainly the latter). Although there are a few in Australia and Canada, virtual schools are a uniquely American phenomenon (Berry, 2017). Depending on where they live in the U.S., primary and (mainly) secondary students can receive their entire education online or use platforms to support learning in their physical classrooms (Digital Learning Collaborative, 2020). The most common models of virtual schools include the following:

- **Statewide supplemental programs.** Students take individual courses but are enrolled in a physical school or cyber school within the state. These programs are authorized by the state and overseen by state education governing agencies.
- **District-level supplemental programs.** These are generally operated by autonomous districts and typically are not tracked by state agencies.
- **Single-district cyber schools.** These provide an alternative to the traditional face-to-face school environment and are offered by individual districts for students within that district.
- **Multi-district cyber schools.** This represents the largest growth sector in primary and secondary online learning. They are operated within individual school districts but enroll students from other school districts within the state.
- **Cyber charters.** These are chartered within a single district but can draw students from across the state. In many cases they are connected in some way to commercial curriculum providers (Berry, 2017, pp. 24–25).

The online teacher is usually the teacher of record and may teach in one or several of these models.

Despite the limited data on preparation for online teachers in virtual schools, there is some evidence that many of these virtual schools are progressively attempting to formally prepare their own instructors—at least during some point in their online teaching career. The same 2010 study reported that the percentage of new teachers with no preparation to teach online decreased to 12% after five years of online teaching while 43% of virtual school teachers with 6-10 years' experience reported preparation in teaching online. Ninety-four percent of teachers surveyed reported receiving professional development in online instruction from their school or organization versus 30% who received preparation from universities (Dawley et al., 2010). While these data are more than a decade old, they at least suggest that there is greater awareness of the importance of formal instruction in online teaching.

A number of virtual schools and state offices of education—in Florida, Iowa, Michigan, and Georgia, states with well-established virtual school systems—have increasingly required virtual school teachers to complete some kind of online training and professional development prior to teaching online, sometimes through the school itself (Barbour, 2014). For example, in order to be considered for adjunct instructor positions, incoming teachers at the Georgia Virtual School must successfully complete the school's *Effective Online Teaching* program—a 20–40-hour online program (depending on prior experience) (Georgia Virtual Learning, 2022). Florida Virtual School (FLVS) prepares online instructors and offers continuous professional development to online teachers. FLVS has contracted with Florida universities to provide instruction in online learning to potential FLVS instructors, to supervise FLVS instructors as they complete an internship teaching their first online class, and to mentor first-year online teachers (Winder & Odom, 2022).

Texas Virtual School Network (TXVSN) requires state-level teacher certification in the content area and grade level of the course, and TXVSN teachers are trained in best practices in delivering online instruction (Texas Education Agency, 2022). The Virtual High School Global Consortium requires all prospective teachers to complete an online course in online pedagogy and all potential course developers to complete an online course in online course design (Barbour, 2014).

### 13.4.4 Donor-Funded Educational Programs

Within donor-funded international education programs, the degree to which implementing agencies prepare online instructors is also unclear. The author's experience suggests that such preparation is almost non-existent, but there are no data to substantiate or refute such a claim.

One exception was Indonesia's USAID-funded, EDC-implemented Decentralizing Basic Education 2 (2005–2011) school-based coaching program. Online instructors participated in online learning over a two-month period as *learners* and then received a two-week face-to-face orientation in online instruction. Instructors worked with a teaching partner, supporting one another, and were mentored by a certified online instructor as they began their own online teaching experience. Also within Indonesia, EDC prepared a number of university faculty in online instruction and course design from teacher training colleges across the country through EDC's *EdTech Leaders Online* program. In the nation of Georgia, the Millennium Challenge Corporation-funded, IREX[6]-administered Training Educators for Excellence project used a mainly face-to-face multi-day workshop to prepare the Ministry of Education and Science's Teacher Professional Development Center (TPDC) staff to be online instructors.

### 13.4.5 Online Teaching Practica

Clinical field experiences or teacher "practica" (where teacher candidates try, often for the first time, to put into practice all they have learned in an attempt to teach a group of students) are

[6] IREX is the International Research & Exchanges Board.

the cornerstone of traditional teacher education programs. As with a brick-and-mortar classroom for a future *in-person* teacher, the authentic learning environment to prepare a teacher for a *virtual* environment should be an *online* setting. This virtual apprenticeship should occur with the cooperation of an expert online teacher who is able to make explicit the strategies, techniques, and approaches to teaching (Archambault & Kennedy, 2018, p. 227).

Yet, Archimbault et al. (2016) report that only 4% of all U.S. teacher education programs surveyed (online and in-person)—a total of 15 in all[7]—offer an *online practicum* to teach online. These experiences range in length from 4 to 16 weeks and require students to complete activities such as teaching synchronous lessons, providing feedback, and participating in discussion forums. Again, these programs also tended to be concentrated in U.S. states with a strong virtual school presence—Florida, Iowa, Georgia, and Michigan.

Even *fully online* teacher education programs that prepare teacher candidates *online* place pre-service teachers in brick-and-mortar schools for their teaching practicum (Koenig, 2020). As one example, Hibernia College in Ireland, a popular online alternative for those wishing to become teachers, offers their online teacher candidates in-person practica in brick-and-mortar schools exclusively (Burns, in press).

Changes are afoot, albeit slowly. In many contexts, the COVID-19 pandemic shifted pre-service teacher practica online. Studies from Egypt and Malaysia, though small, suggest that pre-service candidates who participated in *online* teaching practica had higher degrees of self-efficacy in terms of online teaching and found the online practicum to be more useful and less stressful than a face-to-face practicum—reasons included their own shyness, concerns about their appearance, and classroom management issues. These practicing online teachers faced the typical challenges of online learning—issues with their digital skills and their own time management issues (Annamalai et al., 2022; Badawi, 2021; Berry, 2017).

Another study of online micro-teaching as part of teacher preparation at a Czech university, student-teachers reported that the skills gained from teaching face-to-face—classroom management, checking understanding, giving instructions, nonverbal communication, and monitoring students' performance—were not easily transferable to the online environment (Fořtová et al., 2021), further supporting the assertion that teachers and instructors should be prepared in the modality—online, blended or in-person—in which they plan to teach.

The above studies, although small and not rigorous, have helped to generate information on future teachers' perceptions of doing their teaching practica online. However, the larger problem around online instructor preparation persists. Online programs in general have neglected to prepare instructors and teachers to teach online. The lack of accounting—and accountability—of the preparation of instructors in online programs obscure the existence, pervasiveness, and consequences of such an omission.

## 13.5 Preparing Instructors to Teach Via Distance

There are a number of ways to prepare instructors and teachers to teach online. This section offers several strategies for doing so.

[7] The authors demur: "This is a non-random, purposeful sample used to gather as many responses as possible from teacher education programs across the United States ... it provides an updated snapshot but is not intended to be generalizable across all teacher education programs in the United States" (p. 5).

### 13.5.1 Prepare Distance Instructors in the Same Distance Modality through Which They Will Teach

Distance education programs can prepare instructors in same type of quality and extensive professional development and support activities in which their teacher-learners will engage. This instruction can be a blended approach, with both distance-based and in-person learning in which instructors practice using the technology, complete learner activities, grade assignments, and summarize discussions. Distance programs can do this by having distance instructors working together and by creating a sandbox in the LMS for purposes of instructor practice or learning.

Such a mode-based instruction offers several benefits in helping instructors to:

- Develop a sense of learning from a learner perspective (Myung et al., 2020)
- Construct the necessary skill set to foster interaction and communication with and between learners during the distance experience
- Use information and communication tools to support instructional methodologies that encourage learner collaboration and knowledge acquisition
- Understand the strengths and limitations of the print-based or digital content instructors create and its effects on learners (Cadorath et al., 2002)
- Be able to use instructor-generated content to teach (Cadorath et al., 2002)

### 13.5.2 Enroll Instructors in Courses Offered by External Providers

There are a number of free, low-cost, and full cost online teacher pre-service and in-service programs for those wishing to teach online. Many of these are open universities or online universities, for example:

- The UK's Open University, *Open Learn* platform, offers a free online teaching course—*Take Your Teaching Online*.
- The Commonwealth of Learning's *Teacher Education Program* focuses on improving the institutional capacity of teachers in academic and vocational streams to use open and distance learning (ODL) and ICT effectively as well as improving the quality of teaching and learning to ensure positive learning outcomes (Commonwealth of Learning, 2016).
- Canada's open university, Athabasca University, offers courses in online and blended instruction.
- Contact North (Contact Nord), an Ontario-based not-for-profit distance education network, houses an extensive portal of online learning resources and offers free online sessions in every aspect of online learning (Contact North | Contact Nord, n.d.).
- Penn State University's *World Campus* prepares instructors to teach online.
- The University of New South Wales (Australia) *Learning to Teach Online* is a free online program that helps instructors in any discipline learn a range of online instructional pedagogies.
- *Coursera* and *Future Learn* offer free MOOCs for teaching online.
- UNESCO's ICT Competency Framework via OER Commons offers collections of Open Education Resources (OER) curated by UNESCO and partner countries and aligned to the UNESCO ICT Competency Framework for Teachers (CFT) so teachers can use ICTs for more efficient teaching.

In addition to the above free or low-cost university programs, a number of *for-profit* universities have burnished their *bona fides* in offering *degrees* in online teaching. Full Sail University, a private, for-profit, U.S.-based university offers certification in online instruction, as does the fully online, for-profit University of Phoenix. The latter includes several months of training plus an online mentor who works behind the scenes with the novice online instructor.

A number of nonprofits have stepped into the void to provide *in-service* professional development to existing online instructors so they can teach in fully online or hybrid environments. (The online university courses, MOOCs, and resources listed above also offer both pre-service and in-service instruction in teaching online.) Through such professional development, teachers can receive some kind of certification (but not a formal degree) in online instruction.

Three such in-service programs include the following:

1. The International Society for Technology in Education (ISTE) offers a nine-week, fee-based blended course for online training certification programs. This course includes 30 hours of training followed by six months to curate a portfolio. ISTE also offers *Learning Keeps Going*, a portal of free resources and webinars to teach online, created originally for emergency remote teaching (International Society for Technology in Education, n.d.).
2. The Online Learning Consortium's online preparation programs, for higher education instructors.
3. EDC's *EdTech Leaders Online is* an eight-session program to prepare educators to teach online.

All of these programs are fee-based.

### 13.5.3 Require Instructors to Take an Online Course

If the previous two recommendations are not feasible, prospective online instructors could enroll in any number of free online courses—on any topic—via a MOOC or online course provider. Future instructors could take notes on how an online instructor (if there is one) acts, document the strengths and weaknesses of the course, jot down specific ideas, generally reflect on what he or she found most conducive for learning online, and even potentially ask the online instructor for tips or guidance. This option allows instructors to experience online learning from a *learner* perspective and experience online learning. Ostensibly, the reflections and ideas gathered from such an experience could help to inform the instructors' own online teaching.

### 13.5.4 Use Scripted Teaching

Finally, in terms of preparing educators to teach online, some online programs forgo extensive online instructor training in difficult areas, such as online inquiry, collaboration, and discussion, in favor of providing instructors with scripts and prompts that attempt to compensate for their lack of skills or to supplement their existing skills in these areas. This practice may be more relevant to text-based asynchronous online learning courses. Examples of these scripts and prompts include:

- *prompt-based, content-specific scripts* that focus on teaching content to online learners;
- *interaction-oriented scripts* to promote learner discussions and reflection;
- *prompt-based, content-specific scripts* to support the learners' identification of relevant information; and,
- *prompt-based, interaction-oriented scripts* to encourage learners to assume specific inquiry-related tasks and roles (Clark et al., 2003, p. 61).

The research on scripted online teaching is fairly weak—neither plentiful, current, rigorous, or focused on the performance of the online instructor (Means et al., 2009; Weinberger et al., 2010). It pales greatly in quantity and quality with studies on scripted lessons in distance education modalities such as print and radio, which have been shown to play a positive role in the quality of learning interactions (Gray-Lobe et al., 2022; Morris et al., 2015; Piper et al., 2018).The majority of studies that do exist on scripted online teaching indicate that the presence of scripts to guide interactions among online learners do *not* appear to improve learning outcomes (Means et al., 2009, p. 46).

Less constrained than scripts, but potentially helpful for online instructors—particularly novice ones or those with limited preparation—are protocols, which will be discussed in greater length in *Chapter 15: Building Community*. Protocols are scripts or a set of prescribed steps or prompts to structure focused, intentional, and deliberative conversations. They can help routinize and structure instruction, as well as help online instructors deal with challenges associated with online learning, such as learner non-participation. They also offer a level of quality instruction that is reassuring to both the instructor and the learner (McDonald et al., 2015). Here, too, however, the research on protocols as part of online teaching is scant.

## 13.6 Conclusion

Good teaching matters. It may matter even more online.

In order for distance education programs to prepare or upgrade the knowledge and skills of learners successfully, distance instructors require rigorous professional development in the distance education modality in which they will be teaching.

Distance learning institutions should adopt or develop standards for teaching in an online environment (see Figure 13.1), and online instructors must exhibit qualifications that conform to these standards. They should possess *technology skills*, including the ability to use synchronous and asynchronous tools such as discussion boards, chat tools, and digital whiteboards. They must be able to *promote interaction between instructors and learners* and demonstrate strategies to encourage active learning, interaction, participation, and collaboration in the online environment. They should know how to *provide regular feedback*, prompt responses, and provide clear expectations to learners. They should be able to *design and deliver online assessments* that are not only valid and reliable but also complex enough to assess learner knowledge beyond a multiple-choice exam. Similarly, administrators of distance learning programs also require professional development and support so that they are cognizant of the instructional changes and requisite inputs (standards, good instruction, robust design), resources, and supports that fully sustain any distance education system.

Underlying this entire process are three challenges. The first is the need to continue to develop new paradigms of distance education, as discussed in Chapter 7, that shift from passive and solo learning in which materials are placed online and learners fend for themselves. Distance education must embrace the learning sciences and research on high-quality professional development and how adults learn.

Next, teaching at a teacher training college or university program—whether online or face-to-face—is often a solo endeavor where instructors/teacher educators receive little professional development, support, and oversight (Hökkä & Eteläpelto, 2014). These omissions denigrate not just the quality of instruction pre-service and in-service teachers receive, they also undermine the "development of teacher training colleges as high-quality professional institutions" (Du Plessis & Muzaffar, 2010, p. ix).

The final challenge far exceeds the lack of preparation to teach online. Many university instructors and teacher educators often lack teaching degrees and have not been formally prepared to teach at all (Burns, in press; Reid & Kleinhenz, 2015). Nor have they ever taught in a preschool, primary school, or secondary school classroom. The negative implications of this failure to require those preparing future teachers—and training current ones—to have actual experience teaching children and adolescents goes well beyond the ability to teach online. It charges those who have only a theoretical knowledge of teaching with inculcating the practical skills needed to teach. This mismatch adversely affects not just the fields of distance education or teacher education; it negatively impacts the quality of classroom teaching itself (Hökkä & Eteläpelto, 2014).

Citation: Burns, M. (2023). Preparing Distance Instructors. In *Distance Education for Teacher Training: Modes, Models and Methods.* (2nd Edition). Washington, DC: Education Development Center.

## References

Akyol, Z., & Garrison, D. (2011, March). Understanding cognitive presence in an online and blended community of inquiry: Assessing outcomes and processes for deep approaches to learning. *The British Journal of Educational Technology, 42*(2), 233–250. https://doi.org/10.1111/j.1467-8535.2009.01029.x

American Association of Colleges of Education. (2022). *Teacher educator technology competencies program*. American Association of Colleges of Education. https://aacte.org/professional-development-events/tetcp/

Anand, K., & Lall, M. (2021). Teachers' digital agency and pedagogy during the COVID-19 crisis in Delhi. *NORRAG Special Issue, 6*, 64-66. https://discovery.ucl.ac.uk/id/eprint/10138582/

Annamalai, N., Ab Rashid, R., Harb Alqaryouti, M., Eddin Sadeq, A., Al-Smadi, O., & Kumar, J. (2022). Online Teaching Practicum in Malaysia in the Time of COVID-19 Pandemic. *Frontiers in Psychology, 3431*. https://www.frontiersin.org/articles/10.3389/fpsyg.2022.871971/full

Archambault, L., Kennedy, K., DeBruler, K., Shelton, C., Dalal, M., McAllister, L., & Huyett, S. (2016). *Examining teacher education programs and field experiences in k-12 online learning environments.* http://media.mivu.org/institute/pdf/examinete2016.pdf

Archambault, L., & Kennedy, K. (2018). Teacher preparation for K-12 online and blended learning. In K. Kennedy & R. Ferdig (Eds.), *Handbook of research of K12 online and blended learning.* (pp. 221-246). Carnegie Mellon University ETC Press.

Badawi, M. (2021). The Effect of E-Practicum on Developing EFL Student Teachers' Instructional Performance and E-Teaching Self-Efficacy. *IOSR Journal of Research & Method in Education, 16*(16), 685-727. https://dx.doi.org/10.21608/ssl.2021.71053.1066

Baker, C. (2010). The impact of instructor immediacy and presence for online student affective learning, cognition, and motivation. *Journal of Educators Online, 7*(1), 1-30. doi:10.9743/JEO.2010.1.2

Barbour, M. (2014). Training teachers for a virtual school system: A call to action. *K-12 Education: Concepts, Methodologies, Tools, and Applications*, 1398-1415. https://www.igi-global.com/chapter/training-teachers-for-a-virtual-school-system/88223

Bawa, P. (2016). Retention in online courses: Exploring issues and solutions—A literature review. *Sage Open, 6*(1). https://doi.org/10.1177/2158244015621777

Berry, S. (2017). *Educational outcomes of synchronous and asynchronous high school students: A quantitative causal-comparative study of online algebra 1* [Doctoral dissertation, Northeastern University].

Blunden, H., Yoon, J., Kristal, A., & Whillans, A. (2019). *Soliciting advice rather than feedback yields more developmental, critical, and actionable input. Unpublished results.* Harvard Business School Working Paper 20-021: https://www.hbs.edu/ris/Publication%20Files/20-021_45b4e0ac-6d65-4d33-b293-b3bddcb60f78.pdf

Buckingham, M., & Goodall, A. (2019, May). The feedback fallacy. *Harvard Business Review*, 92-101. https://hbr.org/2019/03/the-feedback-fallacy

Burns, M. (2010, February). 17,000 islands, 1 goal: Indonesia turns to online resources to create a newtork of school-based coaches. *The Learning Professional, 31*(1), 18-23. https://learningforward.org/journal/technology/17000-islands-1-goal/

Burns, M. (2013, December). Staying or leaving? Designing for persistence in an online educator training program in Indonesia. *Open Learning: The Journal of Open and Distance Learning, 28*(2), 141-152. doi: http://dx.doi.org/10.1080/02680513.2013.851023

Burns, M. (2019). For want of a good theory: Considerations for technology integration in well-resourced schools. In M. Clausen (Ed.), *A Closer Look at Educational Technology: Technology in a Globalizing World* (pp. 29-90). Nova Science Press.

Burns, M. (2020, April 7). *From analogue to digital: School goes online—Part 1.* eLearning Industry. https://elearningindustry.com/analogue-digital-school-goes-online-learning-in-the-us

Burns, M. (2021). *Background paper prepared for the 2023 Global Education Monitoring report, Technology and education: Technology in education.* United Nations Educational, Scientific and Cultural Organization. https://unesdoc.unesco.org/ark:/48223/pf0000378951

Burns, M. (in press). *Barriers and supports for technology integration: Views from teachers. Background chapter prepared for the Global Education Monitoring report: Technology and education.* United Nations Educational, Scientific and Cultural Organization.

Cadorath, J., Harris, S., & Encinas, F. (2002). Open learning. *Training for Distance Teaching through Distance Learning, 17*(2), 139-152. https://doi.org/10.1080/02680510220146904

Clark, D., Weinberger, A., Jucks, R., Spitulnik, M., & Wallace, R. (2003). Designing effective science inquiry in text-based computer supported collaborative learning environments. *International Journal Of Educational Policy Research And Practice, 4*(1).

Cobo, C., Hawkins, R., & Rovner, H. (2020, March 31). *How countries across Latin America use technology during COVID19-driven school closures.* World Bank. https://blogs.worldbank.org/education/how-countries-across-latin-america-use-technology-during-covid19-driven-school-closures

Commonwealth of Learning. (2016). *Teacher education program*. Commonwealth of Learning. https://oasis.col.org/items/d843d673-41e8-4930-b847-2399eece8617

Contact North | Contact Nord. (n.d.). *Welcome to Ontario's community-based bilingual distance education and training network.* Contact North. http://www.contactnorth.ca

Dahya, N., & Dryden-Peterson, S. (2017). Tracing pathways to higher education for refugees: The role of virtual support networks and mobile phones for women in refugee camps. *Comparative Education, 53*(2), 284-301.

Dawley, L., Rice, K., & Hinck, G. (2010, November). *Going virtual! 2010. The status of professional development and unique needs of K–12 online teachers.* Department of Educational Technology Boise State University. https://stu.westga.edu/~bthibau1/MEDT%20 7472-%20Huett/IAND%20B%20%232%20%20GOING%20VIRTUAL.pdf

Dawson, K., & Dana, N. (2018). Professional development for K-12 online teachers. In K. Kennedy & R. Ferdig (Eds.), *Handbook of research of K12 online and blended learning.* (pp. 247-260). Carnegie Mellon University ETC Press.

Digital Learning Collaborative. (2020). *Snapshot 2020: A review of K–12 online, blended, and digital learning.* Digital Learning Collaborative.

Dikkers, A. (2018). Social interaction in K-12 online learning. In K. Kennedy & R. Ferdig (Eds.), *Handbook of research of K12 online and blended learning* (2nd ed., pp. 509-522). Carnegie Mellon University ETC Press. https://www.learntechlib.org/p/182993/

Diliberti, M., & Schwartz, H. (2021). *The rise of virtual schools: Selected findings from the third American School District Panel Survey.* RAND Corporation. https://www.rand.org/pubs/research_reports/RRA956-5.html

DiPietro, M., Ferdig, R., Black, E., & Presto, M. (2010, Spring). Best practices in teaching K-12 online: Lessons learned from Michigan virtual school teachers. *Journal of Interactive Online Learning, 9*(3), 10-35. https://www.learntechlib.org/p/109394/

Dobbie, W., & Fryer, Jr., R. (2013). Getting Beneath the veil of effective schools. *American Economic Journal: Applied Economics, 5*(4), 28–60. https://dx.doi.org/10.1257/app.5.4.28

Du Plessis, J., & Muzaffar, I. (2010). *Professional learning communities in the teachers' college: A resource for teacher educators.* EQUIP 1: https://files.eric.ed.gov/fulltext/ED524465.pdf

Fořtová, N., Sedláčková, J., & Tůma, F. (2021). And my screen wouldn't share...: EFL student-teachers' perceptions of ICT in online teaching practice and online teaching. *Íkala, Revista de Lenguaje y Cultura, 26*(3), 513-529. https://doi.org/10.17533/udea.ikala/v26n3a03

Garrett, R., Simunich, B., Legon, R., & Fredericksen, E. (2021). *CHLOE 6: Online learning leaders adapt for a post-pandemic world, The changing landscape of online education, 2021.* Quality Matters. https://www.qualitymatters.org/qa-resources/resource-center/articles-resources/CHLOE-6-report-2021

Georgia Virtual Learning. (2022). *Effective online teaching pathway*. https://gavirtualpd.catalog.instructure.com/browse/galearns/ts/gavpl/programs/eot

Goldstein, D. (2020, June 5). The class divide: Remote learning at 2 schools, private and public. *New York Times.* https://www.nytimes.com/2020/05/09/us/coronavirus-public-private-school.html

Gray, J., & DiLoreto, M. (2016). The effects of student engagement, student satisfaction, and perceived learning in online learning environments. *International Journal of Educational Leadership Preparation, 11*(1). https://files.eric.ed.gov/fulltext/EJ1103654.pdf

Gray-Lobe, G., Keats, A., Kremer, M., Mbiti, I., & Ozier, O. (2022). *Can Education Be Standardized? Evidence from Kenya.* New Globe Schools. https://issuu.com/newglobe/docs/can_education_be_standardized_evidence_from_kenya?fr=sZWEzMjUwOTg0NjU

Halkic, B., & Arnold, P. (2019). Refugees and online education: Student perspectives on need and support in the context of (online) higher education. *Learning, Media and Technology, 44*(3), 345-364. https://doi.org/10.1080/17439884.2019.1640739

Halloran, C., Jack, R., Okun, J., & Oster, E. (2021). *Pandemic schooling mode and student test scores: Evidence from US states (No. w29497).* doi:10.3386/w29497

Henley, A., & DiGennaro Reed, F. (2015, November). Should you order the feedback sandwich? Efficacy of feedback sequence and timing. *Journal of Organizational Behavior Management, 35*(3-4), 321-335. https://doi.org/10.1080/01608061.2015.1093057

Hennessy, S., D'Angelo, S., McIntyre, N., Koomar, S., Kreimeia, A., Cao, L., . . . Zubairi, A. (2022). Technology use for teacher professional development in low- and middle-income countries: A systematic review. *Computers and Education Open, 3.* EdTech Hub. https://doi.org/10.1016/j.caeo.2022.100080

Hökkä, P., & Eteläpelto, A. (2014). Seeking new perspectives on the development of teacher education: A study of the Finnish context. *Journal of Teacher Education, 65*(1), 39-52. https://doi.org/10.1177/0022487113504220

International Society for Technology in Education. (n.d.). *Introducing ISTE certification.* International Society for Technology in Education. https://cdn.iste.org/www-root/Libraries/Documents%20%26%20Files/PDFs/iste-certification_brochure_9-2018.pdf

Jaquith, A., & Stosich, E. (2019). *Developing a school culture of meaningful feedback deepens everyone's learning. Field facing memo # 3.* Stanford Center for Opportunity Policy in Education. https://edpolicy.stanford.edu/library/publications/1616

Jukes, M., Turner, E., Dubek, M., Halliday, K., Inyega, H., Wolf, S., . . . Booker, S. (2016). Improving literacy instruction in Kenya through teacher professional development and text messages support: A cluster randomized trial. *Journal of Research on Educational Effectiveness.* doi:DOI: 10.1080/19345747.2016.1221487

Koenig, R. (2020, May 28). Pandemic may (finally) push online education into teacher prep programs. *EdSurge*. https://www.edsurge.com/news/2020-05-28-pandemic-may-finally-push-online-education-into-teacher-prep-programs

Liu, P., Rim, S., Min, L., & Min, K. (2022). The surprise of reaching out: Appreciated more than we think. *Journal of Personality and Social Psychology*. https://doi.org/10.1037/pspi0000402

Lowenthal, P., Snelson, C., & Perkins, R. (2018). Teaching massive, open, online, courses (MOOCs): Tales from the front line. *The International Review of Research in Open and Distributed Learning, 19*(3). https://doi.org/10.19173/irrodl.v19i3.3505

Maor, D., & Zariski, A. (2003). Is there a fit between pedagogy and technology in online learning? *Proceedings of the 12th Annual Teaching Learning Forum.* Perth, Australia: Partners in Learning, Edith Cowan University. https://researchrepository.murdoch.edu.au/id/eprint/8687/1/Is_there_a_fit_between_pedagogy.pdf

Martin, F., Wang, C., & Sadaf, A. (2020). Facilitation matters: Instructor perception of helpfulness of facilitation strategies in online courses. *Online Learning, 24*(1), 28-49. https://doi.org/10.24059/olj.v24i1.1980

McDonald, J., Mohr, N., Dichter, A., & McDonald, E. (2015). *The power of protocols: An educator's guide to better practice.* Teachers College Press.

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies.* United States Department of Education.

Mendenhall, M., Bowden, L., Cha, J., Collas, S., Falk, D., French, S., . . . Skinner, M. (2017). *Strengthening teacher professional development: Local and global communities of practice in Kakuma Refugee Camp, Kenya.* https://www.eccnetwork.net/resources/strengthening-teacher-professional-development

Mishra, P., & Koehler, M. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record, 108*(6), 1017-1054. doi:doi:10.1111/j.1467-9620.2006.00684.x

Molloy, E., Ajjawi, R., Bearman, M., Noble, C., Rudland, J., & Ryan, A. (2020, January). Challenging feedback myths: Values, learner involvement and promoting effects beyond the immediate task. *Medical education, 54*(1), 33-39. https://doi.org/10.1111/medu.13802

Morris, E., & et al. (2015). *Radio instruction to strengthen education and Zanzibar teacher upgrading by radio: Post project evaluation in Zanzibar.* Education Development Center.

Myung, J., Gallagher, A., Cottingham, B., Gong, A., Kimner, H., Witte, J., . . . Hough, H. (2020). *Supporting learning in the COVID-19 context: Research to guide distance and blended instruction.* Policy Analysis for California Education (PACE). https://files.eric.ed.gov/fulltext/ED609208.pdf

National Center for Education Statistics. (2019, January). *Profile of undergraduate students: Attendance, distance and remedial education, degree program and field of study, demographics, financial aid, financial literacy, employment, and military status: 2015–16.* U.S. Department of Education National Center for Education Statistics: https://nces.ed.gov/pubs2019/2019467.pdf

Organisation for Economic Co-operation and Development. (2020). *Learning remotely when schools close: How well are students and schools prepared? Insights from PISA.* OECD. https://read.oecd-ilibrary.org/view/?ref=127_127063-iiwm328658&title=Learning-remotely-when-schools-close

Pillow, T., & Dusseault, B. (2020, May 13). Analysis: For hundreds of thousands of kids at some of America's biggest school districts, there's still no consistent plan for remote learning nearly 2 months into the pandemic. *The 74*. https://www.the74million.org/article/analysis-for-hundreds-of-thousands-of-kids-at-some-of-americas-biggest-school-districts-theres-still-no-consistent-plan-for-remote-learning-nearly-2-months-into-the-pandemic/

Piper, B., Sitabkhan, Y., Mejia, J., & Betts, K. (2018). Effectiveness of teachers' guides in the in the Global South: Scripting, Learning Outcomes, and Classroom Utilization. *RTI Press Publication No. OP-0053-1805*. https://doi.org/10.3768/rtipress.2018.op.0053.1805

Pota, V., Hennessy, S., Koomar, S., Kreimeia, A., Zubairi, A., Aerts, C., & Gault, C. (2021). *Turning to technology: A global survey of teachers' responses to the COVID-19 pandemic*. T4. https://t4.education/t4-insights/reports/turning-to-technology

Puentedura, R. R. (2015). *SAMR: A brief introduction.* Hippasus. http://hippasus.com/rrpweblog/archives/2015/10/SAMR_ABriefIntro.pdf

Quality Matters, Virtual Learning Leadership Alliance, and Digital Learning Collaborative. (2022). *National standards for quality online teaching*. National Standards for Quality Online Teaching. https://www.nsqol.org/the-standards/quality-online-teaching/

Ragusa, A., & Crampton, A. (2018). Sense of connection, identity and academic success in distance education: Sociologically exploring online learning environments. *Rural Society, 27*(2), 125-142. https://doi.org/10.1080/10371656.2018.1472914

Rapanta, C., Botturi, L., Goodyear, P., Guàrdia, L., & Koole, M. (2020, October). Online university teaching during and after the COVID-19 crisis: Refocusing teacher presence and learning activity. *Postdigital Science and Education, 2*(3), 923-945. https://doi.org/10.1007/s42438-020-00155-y

Reid, K., & Kleinhenz, E. (2015). *Supporting teacher development: Literature review.* Australian Council for Educational Research.

Reupert, A., Maybery, D., Patrick, K., & Chittleborough, P. (2009). The importance of being human: Instructors' Personal presence in distance programs. *International Journal of Teaching and Learning in Higher Education, 21*(1), 47-56. http://www.isetl.org/ijtlhe/

Rourke, R., Anderson, T., Garrison, D., & Archer, W. (2001). Assessing social presence in asynchronous text-based computer conferencing. *Journal of Asynchronous Learning Networks, 5*(2), 1-17.

Salmon, G. (2011). *E-moderating: The key to teaching and learning online* (3rd ed.). Routledge.

Shea, P., Pickett, A., & Pelz, W. (2004). Enhancing student satisfaction through faculty development: The importance of teaching presence. In J. Bourne & J. Moore (Eds.), *Elements of quality online education: Into the mainstream* (pp. 39–59). Sloan Consortium.

Shulman, L. (1986, February). Those Who Understand: Knowledge Growth in Teaching. *Educational Researcher, 15*(2), 4-14. http://www.jstor.org/stable/1175860

Shulman, L. (2005). Signature pedagogies in the professions. *Deadalus, 134*(3), 52–59. https://www.jstor.org/stable/20027998#metadata_info_tab_contents

Swan, K. (2006). Virtual interaction: Design factors affecting student satisfaction and perceived learning in asynchronous online courses. *Distance Education, 22*(2), 306–331. https://doi.org/10.1080/0158791010220208

Texas Education Agency. (2022). *Texas virtual school network*. Texas Education Agency. https://tea.texas.gov/academics/learning-support-and-programs/texas-virtual-school-network

Timperley, H., Wilson, A., Barrar, H., & Fung, I. (2007). *Teacher professional learning and development: Best evidence synthesis iteration.* Ministry of Education. http://www.educationcounts.govt.nz/publications/series/2515/15341

United Nation's Educational, Scientific and Cultural Organization. (2018). *UNESCO ICT competency framework for teachers.* UNESCO: https://unesdoc.unesco.org/ark:/48223/pf0000265721

United Nations Educational, Scientific and Cultural Organization. (2021, June 10). *UNESCO's rapid teacher training on open, distance and online learning reaches 1400 teachers in Zimbabwe*. UNESCO: https://www.unesco.org/en/articles/unescos-rapid-teacher-training-open-distance-and-online-learning-reaches-1-400-teachers

Vidić, T., Klasnić, I., & Đuranović, M. (2022). Student evaluation of online teaching quality, Their own engagement and success expectancy in the future profession. *International Journal of Emerging Technologies in Learning*, *17*(4), 135-147. https://doi.org/10.3991/ijet.v17i04.27517

Weinberger, A., Stegmann, K., & Fischer, F. (2010). Learning to argue online: Scripted groups surpass individuals (unscripted groups do not). *Computers in Human behavior*, *26*(4), 506-515. https://doi.org/10.1016/j.chb.2009.08.007

Winder, R., & Odom, J. (2022, September 20). *4 ways a big online school is engaging and retaining its teachers*. District Administration. https://districtadministration.com/florida-virtual-school-engage-retain-teachers/

Section II. Chapter 14

# PREPARING DISTANCE LEARNERS

## Table of Contents

**Best Practice:** Successful distance education programs prepare learners to successfully complete their distance education program.

## 14.1 Overview

For many prospective and current teachers, their first experience as a distance learner may occur in their very first distance learning program. For highly structured, technically simple, and classroom-based modes of distance education such as interactive audio instruction (IAI), instructional television, or short online mini-modules, a lack of preparation in these modes of distance education may make learning and implementation of learning difficult. But for less structured, highly technical, and non–classroom-based modes of distance education—immersive environments, online courses, or self-directed print-based learning—a lack of preparation in the intended mode of distance learning may make transfer of learning impossible.

The education world was introduced to the complexity of learning via distance during the COVID-19 pandemic remote schooling in 2020. The concept of "attrition," or dropping out of an online program, moved from a dry, abstract education metric to a global learning crisis and educational tragedy as students simply disappeared from their online courses, adaptive learning programs, or *Zoom* classes (Spitzer et al., 2021).

Long before the COVID-19 pandemic, attrition emerged as a perennial problem in distance learning programs as noted in Chapter 5. For example, in 1998 Potashnik & Capper estimated the overall attrition rate from mainly print-based distance education courses to be about 40%. Slightly more than a decade later, Latchem & Jung (2010) assessed the attrition rate in Asian open universities (which tended to blend a mix of distance modalities) at 90%. More recent data on Massive Open Online Courses (MOOCs) show that even among high-achieving learners who are motivated and intend to complete their course, only about 20% do so (Kizilcec et al., 2020). And even where learners *do* complete a MOOC course, they are less likely to continue with this mode of instruction. For instance, a multiyear study of the two largest MOOC providers, *Coursera* and *edX*, found that retention rates declined with every cohort, from 38% in 2012 to 7% in 2018 (Reich & Ruipérez-Valiente, 2019).

## 14.2 The Problem of Attrition in Online Courses

The most established distance education route for pre- and in-service teachers is via traditional online courses, a mixture of bichronous or asynchronous instruction. Although it is difficult to determine an exact overall attrition rate for online education, research has typically shown that attrition rates in online courses greatly exceed those of face-to-face instruction; these estimates, however, vary widely, from 10%–20% to 40%–80% (Bawa, 2016; Holder, 2007; Smith, 2010).

Attrition rates are different for different types of online courses. For instance, the attrition rate was 31% for learners from 16 Sub-Saharan African countries participating in the Global e-Schools and Communities Initiatives (GESCI)'s *African Leadership* in ICT (ALICT-LATIC) blended course from 2012-2015 (Santally, 2016, pp. 118–119). For a five-month, cohort-based, highly structured online coaching course in Indonesia, it was less than 5% (Burns, 2013). As noted in Chapter 5, the attrition rate for TESS India's *Enhancing Teacher Education Through OER MOOC!* was 50% across two iterations of the course (Wolfenden et al., 2017, as cited in McAleavy at al., 2018). While there is no fixed rate of attrition or persistence across online courses, we can state with some confidence that for universities and other institutions of higher education (teacher training colleges, for example), a significant portion of online learners fail to complete a course of study.

As Chapter 5 suggests, online learners espouse a number of motivations for taking an online course—flexibility, cost, convenience, and perceived ease of completion. But these motivations may not compensate for the many extrinsic and intrinsic online-learning–related factors that contribute to attrition, which include:

- personal, financial, work-related, and family issues (Barab et al., 2001; Bawa, 2016; Park & Choi, 2009);
- the very open and distant nature of online learning, particularly in asynchronous courses (Perraton et al., 2002);
- a lack of support in many online courses (Burns, 2016a; Price et al., 2007);
- unrealistic expectations about the time and effort needed to complete an online course (Holder, 2007; Stanford-Bowers, 2008);
- unfamiliarity with learning in a distance environment (Bawa, 2016; Latchem & Jung, 2010; Ng, 2012);
- poverty and lower academic ability (Acosta et al., 2021; Price et al., 2007);
- a belief that virtual learning is less real than in-person learning (Park & Choi, 2009; Price et al., 2007); and,
- the fact that many online courses are presented as part of higher education institutions where dropout rates tend to be higher, even in in-person programs (Hanson, 2022).

It is difficult to overstate the degree to which attrition threatens online learning as a viable educational delivery mechanism. Lower retention and completion rates (i.e., higher attrition rates) are a barrier to more widespread adoption of online learning. High rates of attrition, especially as witnessed during the remote learning of the COVID-19 pandemic, undermine the perceived quality, utility, and cost-effectiveness of online learning. Indeed, high rates of attrition undermine the very legitimacy of online learning and call into question whether it is even worth the investment.

Nor can the importance of preparing online learners to succeed in an online environment be overstated. The previous chapter discussed the challenges of teaching well in an online learning environment; it is often equally difficult to learn successfully in an online environment, whether synchronous, asynchronous, or bichronous. This is particularly true for learners who are new to using technology, learning through technology, learning alone in unstructured environments, and who may also face personal, professional, and financial challenges. For many readers working in teacher training programs in the Global South, this profile may essentially constitute the majority of their online learners.

Thus, as will be discussed in this chapter, given the inherent threat of attrition in online learning, online programs must prepare their *learners*, as they do their instructors, to succeed in an online environment.

## 14.3 What Qualities Define Successful Online Learners?

Every online learner is unique. Just as online learners may leave a course for a variety of reasons, each may persist in an online course or course of study in his or her own way. That said, the research generally points to three sets of characteristics that influence persistence in online learning.

### 14.3.1 Personal Characteristics

The first are the *personal characteristics* of the online learner, among them self-discipline, autonomy, responsibility, self-directedness, self-efficacy, and self-regulation (Berry, 2017; Chen et al., 2018; Edisherashvili et al., 2022; Holder, 2007; Hoxby, 2017; Keegan, 1996; Stephen & Rockinson-Szapkiw, 2021; Zimmerman, 2011). The three characteristics of self-directedness, self-efficacy, and self-regulation are distinct, although interrelated, and are frequently conflated. While they are important for in-person learning, their importance is more pronounced in many forms of distance learning, such as online learning (Edisherashvili et al., 2022).

- *Self-directedness* involves learners choosing to initiate their own learning—diagnosing their own needs, formulating learning goals, implementing learning strategies, and evaluating their own efforts and outcomes (Knowles, 1975).
- *Self-efficacy*, previously discussed in Chapter 8, is a belief that the learner can succeed if he or she tries. Learners with high self-efficacy believe that greater effort will lead to successful outcomes, a critical component of self-regulation (Bandura, 1997).
- *Self-regulation* is the ability to organize one's emotions and behavior and thoughts in pursuit of attaining a long-term goal. It typically involves three "phases:" forethought, a focus on performance, and reflection (Zimmerman, 2011).

Broadly, learners who have these qualities generally succeed in online learning. Learners who don't, struggle in online environments. And while there is evidence that online learning can help learners develop these personality characteristics, there is little evidence that online programs are actually doing so (Barbour, 2014, p. 503).

Three categories of learners appear to be particularly vulnerable to attrition. The first are part-time online learners who often face a plethora of competing personal and professional demands (Lowe, 2005). The second are learners who matriculate from face-to-face learning environments that promote more passive learning (Lowe, 2005). The third are online learners who come from disadvantaged backgrounds (Kizilcec & Halawa, 2015). As discussed in *Chapter 5: Online Learning*, attrition rates are much higher among these groups—women, learners who work full time, economically disadvantaged learners, those from the Global South, learners who may not have been raised speaking the online course language of instruction, who are part of a minority racial or ethnic group, who have lower educational attainment, and who are academically at risk (Burns, 2021, p. 77; Chen & Jang, 2010; Kizilcec & Halawa, 2015). These disproportionately high attrition rates among less-affluent groups of learners undermine another of the more compelling justifications for online learning—that it provides equitable access to learners for whom face-to-face learning is not an option (Burns, 2021, p. 77).

### 14.3.2 Learning-Related Characteristics

The next set of attributes addresses *skills related to learning online*. These include expectations about the rigor of online study and its actual level of difficulty; the ability to successfully use technology; prior education level; successful completion of an online course; time management skills; reading and writing ability; and information management skills (Berry, 2017; Harrell & Bower, 2011; Holder 2007; Kizilcec & Halawa, 2015; Mandernach et al., 2006; Park & Choi, 2009).

### 14.3.3 Course and Program-Related Characteristics

Finally, there are *course/program-related variables*, such as access to technology, support, and materials; learner engagement and interaction with other learners; and learners' sense of connection or isolation. Positive learner perceptions of the instructor regarding the responsiveness, frequency, and quality of communication and feedback are linked with successful online completion, as discussed in the previous chapter. Course design and delivery modes (synchronous versus asynchronous) also influence the learner's sense of connection or isolation to the instructor, institution, or a learning group (Lapointe & Reisetter, 2008; Rizvi et al., 2020; Stanford-Bowers, 2008).

All of these variables—those related to the personality of the online learner, to the course itself, and to the nature of online learning—are highly interconnected and affect a learner's readiness to be a successful online learner.

In many parts of the world, pre- and in-service teacher-learners may enter an online learning environment with little or no readiness to learn online. They may have little or no experience with distance learning in general or with online learning in particular. They may not know what an online discussion is, why it is essential to an online course, how to compose the types of thoughtful responses that stimulate and sustain discussion, or how to respond to a colleague's posts—especially if they disagree with the content (Burns, 2010). They may lack familiarity with conventions of online communication. They may have no knowledge of "netiquette"—using appropriate subject lines, addressing the individual or group, and using techniques to extend the online discussion—seemingly minor points that cumulatively can derail communication and learning in an online environment. More critically, learners may not understand the value of interacting with a likeminded community of professionals or see themselves as part of a broader network (Burns, 2010).

This degree of readiness in turn influences the learner's chances of success in an online program. Learners with low readiness—who may not have ever partaken of an online course, who lack suitable time management skills, or who don't read or write well or like to read and write—are more likely to drop out of an online course. In contrast, learners with a high degree of readiness, such as those who possess the personal skills associated with successful online learning and those with strong technology skills who have strong information management skills, are more likely to persist in an online course.

## 14.4 Preparing Teachers to Be Successful Distance Learners

Because attrition is such a threat to online learning, and because its causes are so multilayered, the remainder of this chapter focuses on strategies to prepare pre- and in-service teachers to become "successful" distance learners— that is, learners who complete the requirements of their distance course.

Distance programs can undertake this preparation in a number of ways, as detailed below.

### 14.4.1 Diagnostically Assess a Learner's Readiness to Participate in a Distance Course

Research on successful distance learners demonstrates that they are highly motivated, self-directed, comfortable with technology, and have good time-management skills (Bawa, 2016; Mandernach et al., 2006; Rizvi et al., 2020). While these are clearly the types of learners that distance programs should attempt to reach, they may not be the learners who enroll in a program. Nor do these findings mean that learners who lack *all* of these skills should be screened out of distance education opportunities, since research also demonstrates that these skills can be cultivated in an online learning environment where there is sufficient instructor support (Barbour, 2014; Bawa, 2016; Burns, 2013).

Distance education programs can administer a self-assessment tool that allows the learner to measure his or her readiness to participate in a distance learning course. Surprisingly, most distance learning providers do not appear to use self-assessment data to screen for course registration. Such self-assessment tools can focus on a series of learner behaviors, attributes, or competencies, such as computer, literacy, discussion, time management, and communication skills. Some self-assessment tools include a sum score that indicates whether or not the learner will be successful in the course.[1]

In addition to such self-assessments, programs also can create interest inventories or "mini-courses" that give learners a taste of learning in an online world.

### 14.4.2 Create High-Touch, High-Interaction Courses

While it is easier—logistically and financially—to create asynchronous, self-paced courses for online learners, attrition is much higher in these kinds of courses. There is little structure; no one may know or care if they drop out; and the learner is alone in the pursuit of his/her learning endeavors. Distance education programs should balance asynchronous, self-paced courses that allow for flexibility and convenience with instructor-led, cohort-based, collaborative, and highly synchronous courses that offer multiple opportunities for meaningful and constant learner interaction with content, with the instructor, and with one another.

High-touch, high-interaction, highly structured courses with a heavy emphasis on learner-instructor and learner-learner interaction can create engaging, caring, and collaborative learning environments. Online learners repeatedly cite connectedness with peers as the most important variable in developing a sense of community (as discussed in the next chapter) (Santally, 2016). This connectedness has been shown to significantly affect perceived learning (Berry, 2017; Gray & DiLoreto, 2016). Meaning-making is more easily done as part of a community, especially if the course is organized as a project- or inquiry-based activity and the instructor offers continuous support. It is emotionally and cognitively powerful to wrestle with difficult concepts and interpret information with a community of learners and because of the high degree of interdependence in such a course, there is less temptation to give up since learners need each other to complete their work. Such courses can foster a sense of belonging and community and create an environment that cultivates both self-confidence and self-efficacy (Bandura, 1997).

Grouping composition and size are important in such an environment. Groups must be large enough to promote diversity of experiences and ideas, yet small enough to allow for true collaboration and meaningful roles, lest the "free-riding" problem—where one learner benefits from a group grade without doing his/her share of the work—emerges (Burns, 2016b; Johnson et al., 1990; Laurillard, 2016). In terms of optimal group composition, like-skilled tiered grouping, where members have similar skills, is better than other types of grouping when the end goal is improving learning for all individuals (Wiens et al., 2022).[2] In terms of optimal group size, Johnson et al. (1990) recommend no more than 4–5 learners per team. Anything larger makes meaningful group roles harder to develop (Burns, 2016b).

### 14.4.3 Offer Blended Learning Opportunities

Some may feel that this approach defeats the purpose of a distance program; however, combining distance learning with a sizable portion of face-to-face assistance offers greater opportunity for successful completion of a distance education program. As discussed in Chapter 5, blended learning offers several advantages.

It offers personalized and individualized just-in-time teaching, learning, and support (this topic is discussed at greater length in *Chapter 16: Supporting Distance Learners*). It bridges the

[1] One such resource comes from the U.S. State of Washington's State Board for Community and Technical Colleges: "Is Online Learning for Me?" See https://www.sbctc.edu/becoming-a-student/right-degree-you/is-online-learning-for-me.aspx. See also the McVay Readiness for Online Learning Instrument, which is more grounded in research.

[2] For more information on how to group learners, view https://tinyurl.com/5n72xfts.

psychological, conceptual, and programmatic distances between instructor and learner, between the distance program and the learner, and between the distance program and schools. Both pre- and in-service teachers appreciate the convenience of online learning, but they often want the richness and depth of interacting face-to-face with their colleagues (Burns, in press). Though referencing their relationships with children and adolescents (versus adult learners), a survey of American teachers reflecting on emergency remote teaching during COVID-19 pandemic school lockdowns pointed to some noteworthy concerns about how well they met their students' social-emotional needs online versus face-to-face (Arnett, 2021). In short, as seen during COVID-19 pandemic emergency remote learning, for many instructors and learners, optimal learning situations still involve the physical presence of an instructor.

Finally, for activities specifically related to teaching—such as clinical teaching experiences or in-class implementation of a particular instructional strategy—it is simply easier to monitor, assess, and provide feedback in person versus online. However, in the absence of inspectors, mentors, or supervisors who can travel to a remote school to supervise a practicum or monitor the implementation of a new literacy approach, technology can record the practicum so that supervisors or distance education instructors at another location can review and provide feedback at a later date. Or teachers can use a *Swivl* camera so an offsite coach or observer can assess or assist with classroom implementation of an innovation.

Not all online programs or providers may be able to afford three modes of instruction—fully online, fully face-to-face, and blended. Thus, if courses are online, it is important to blend as much as possible—that is, between modes of instruction (synchronous and asynchronous) and interactions (in-person and online)—via the use of online "face-based" tools (Web conferencing tools).

### 14.4.4 Offer an Orientation

Orientation to online courses or programs has been shown to boost online learner retention and is particularly valuable to novice distance learners (Bawa, 2016; Burns, 2016a). McVay (2000) found that when learners experienced orientation sessions, drop-out rates that had been 35%–50% decreased to 8%–15%. Unfortunately, universities often have omitted orientations for online learners. As an example, as of spring 2020, only 12% of U.S. public four-year institutions required an online learner orientation prior to the term. Since the COVID-19 pandemic, however, this has increased to 34% (Garrett et al., 2021, p. 37).

Orientations offer practical benefits: They allow instructors and learners to examine the syllabus; learn how to use technology, materials, and perform course routines; ask questions; create a group calendar; or complete a Help request. They also can begin to help learners develop online habits of mind: overcoming procrastination, developing self-regulation strategies, and honing appropriate online communication techniques. This technical, social, and academic preparation often is cited by online learners as one of the factors contributing to their success in online learning (Bawa, 2016; Burns, 2013).

Beyond following the "letter" of distance education, orientations can help learners also understand the "spirit" of distance learning. Most importantly, if orientations are in person, learners meet each other and begin to work together. In so doing, they begin to grasp that a successful online learning experience requires a high degree of individual and collaborative involvement and their individual and collective responsibilities as active, engaged, and collegial online learners. When explicitly designed to do so, orientations can prepare potential learners to understand the importance of both community formation and of the Internet as a *vehicle* for community formation. Learners can begin to see their online program or course not just as a collection of resources but as a "place" with like-minded "neighbors," a collection of human collaborative efforts.

### 14.4.5 Differentiate Online Learning Offerings

As Chapter 5 elaborated, online learning is extraordinarily diverse, but we often channel learners into a narrow range of online learning opportunities—an asynchronous course through a learning management system (LMS) or a fully synchronous *Zoom* class.

Online learning can be blended, synchronous, asynchronous, or bichronous, depending on the platform employed. Thus, to get the best for and out of online learners, programs that have the resources to do so, should offer different platforms for online learning. To do begin to do this, however, educators have to understand *who* their learners are, *what* they need to learn, *how* they can best learn, their levels of readiness, and the best way to design and deliver online courses to address the readiness factors raised in the previous section. The answers to these questions determine the platforms to use.

Online platforms, as seen in Chapter 5, occupy a continuum from solo, traditional offerings to more social-collaborative ones. At the more traditional end of the spectrum, *Massive Open Online Courses* (MOOCs) can be made available to learners who are highly self-directed and who prefer to learn at their own pace. Google *Classroom,* which teachers across the globe use for their students, is a platform with which many teachers are comfortable; yet it is little used in adult online learning, except for content storage and workflow. Moving toward the more the collaborative, social end of the spectrum, educational social networking sites, such as *Facebook Groups*, combine the functionality of a traditional LMS with the more peer-based, open, and "flatter" design and interaction of a social networking site (Burns, 2016a).

Here learners can communicate, interact, and collaborate and with structure, time, and support, build some kind of community.

Finally, online immersive environments—virtual worlds, virtual reality, and gaming, for example—occupy (thus far) the farthest end of the continuum from traditional online classes. Although not common as modes of teacher online professional development, as discussed in Chapter 4, they may be particularly helpful when teachers lack strong content knowledge as well as thinking, reasoning, and problem-solving skills. Such platforms can serve as engaging vehicles to promote situated teaching skills while reducing extraneous cognitive load.[3] They can also help teacher-learners interact with and manipulate complex systems and engage in scenarios that would otherwise be impossible (Burns, 2016a).

The key point here is that online learning is, and should be, a highly diverse enterprise and that teacher education programs should embrace new models of online learning and plan teacher learning experiences accordingly. Not every teacher will require the same type of online learning experience, nor will every teacher respond positively or equally to the same model of online learning. Program designers must take care to avoid the "one-size-fits-all" approach of so many current online learning offerings and take care to differentiate online learning offerings based on teachers' diverse needs and learning preferences.

### 14.4.6 Help Learners Develop Study Skills

For many learners coming from the directive, more didactic, and highly structured world of in-person learning, the online environment may simply be too ill-structured, too open, and too disorienting (Bawa, 2016). Thus, to reduce the amount of up-front and ongoing support and guidance learners may demand of their instructors, online learning programs can work

[3] See Chapters 1 and 11 for discussions of cognitive load.

to help them become successful distance-based students who cultivate independent study strategies and skills. These include the following:

- **Time management skills.** These skills include developing schedules, setting aside one hour a day to work on the course, using a timer (such as the Pomodoro technique[4]), making a calendar or schedule, developing mindfulness techniques, setting hard deadlines, and rewarding oneself for completing a task.

  An important part of time management is helping learners understand procrastination, what it is, and why it's dangerous to online learning success. Procrastination is not laziness but rather a technique for "coping with challenging emotions and negative moods induced by certain tasks—boredom, anxiety, insecurity, frustration, resentment, and self-doubt" (Lieberman, 2019). These feelings occur most often when learners are faced with a task that they view as "aversive" (i.e., boring, frustrating, lacking meaning and/or structure), and that therefore leads to unpleasant feelings or a negative mood (Escueta et al., 2020; Sirois & Pychyl, 2013, p. 4). What is the best strategy to overcome procrastination? Just start.

- **Information management skills.** These skills include searching, retrieval, and curation strategies for print and electronic resources as well as the ability to organize and manage files, archive, update and disseminate information. They also involve strategies to avoid being overwhelmed by course requirements.

- **Plan making.** Especially for first-time online learners, distance programs can provide techniques for completing work and establishing plans, routines, and procedures by which learners can accomplish their online work. Plan making has been shown to help in the first few weeks of an online course. It does require continuous revisiting, otherwise the effects fade (Kizilcec et al., 2020).

### 14.4.7 Help Learners with Writing

Online learning is still a read-and-write medium. Many learners have problems with the rhetorical, grammatical, and mechanical conventions associated with writing. In Indonesia, as part of its school-based coaching program, EDC devoted two days of its face-to-face orientation to helping online learners (in this case, coaches in training) develop writing skills. Learners examined the structure and characteristics of good written posts (anchors). They practiced writing online posts alone and with their coaching partner, practiced responding to discussion questions, provided one another with written feedback, and revised their posts. Finally, learners helped to develop indicators for rubrics so that they understood the assessment criteria for their own written work. Text-to-speech tools, such as those found on phones, and voice tools can be harnessed to support or replace writing in an online course, so that online learners who have undiagnosed disabilities or are simply poor writers could still participate in online communication.

Online written communication is a particularly important skill because written communication is often the lifeblood of an asynchronous or bichronous class. It is also critical because of the inherent challenges associated with it. In spaces where we are physically proximate with others, nonverbal cues, the norms of polite behavior, self-consciousness, concern for others, anxiety, shyness, and other social cues subconsciously govern our behavior and keep our inhibitions in check. In online settings, these aforementioned constraints are absent or less apparent, and as such, online communication may become less inhibited—driven by a lack of awareness or concern for how we communicate, how we are perceived, and how we affect others, particularly if we're in an online course where we've never met the other learners and may never meet them (Burns, 2019). We may say something that is rude, insulting, or unpleasant—often unwittingly,

[4] See https://tinyurl.com/mr375sbd

sometimes indifferently, or even deliberately. Suler (2004) calls this the "online disinhibition effect"— essentially acting online in ways we'd never do in person, especially with people we don't know or barely know.

Four discrete though intersecting factors fuel the negative online disinhibition effect. The first is "fast" thinking. This is thinking that is reactive, instinctive, and almost primeval. It is often our first, and instinctively emotional, reaction to an online article, an image, or a comment (Kahneman, 2011). It can lead to the expression of heartfelt sentiments or to reactive angry comments. Second is the anonymity afforded by online interactions—learners may not see each other, know who is in the course, or have interacted with other online classmates. Third is the mechanism of online communication itself: It is *physically* easy, effortless, and instantaneous (Just click "Send."). Finally, unlike an in-person conversation where we see the impact of our words on the listener, we can't see another online learner's reaction. Thus, the combination of an instinctive emotional reaction, the frictionless instantaneity of online communication, the anonymity, and the inability to see the hurt we've caused can severely corrode the morale, motivation, and *esprit du corps* of an online class.

There are a number of ways to address the disinhibition effect: educating learners about proper online communication; helping learners develop "wait time" skills before sending a response, especially where there's disagreement; teaching "netiquette" and digital citizenship skills; and helping learners communicate different points of view in neutral, non-threatening ways for example, by including stems, prompts and protocols for disagreeing or having difficult conversations. Other strategies include ensuring that learners know each other; establishing and enforcing online codes of conduct; using real names and photos; and ensuring that flaming, trolling, bullying and other negative online behaviors be immediately addressed.

### 14.4.8 Help Learners with Reading

Many teacher-learners are not readers. They may not like to read or may be unable to read well—or at all—in official or national languages (e.g., French, Spanish, Portuguese, Dari, or Amharic). Figure 1.2 in Chapter 1 discusses the difficulties of reading well from a screen. Online learners may come from oral cultures in which text-based information is not the norm for information transmission. Or they may read well in the national language but be unfamiliar with the more academic language of online courses.

To address these reading issues, many online course developers have devolved into creating content that are entirely multimedia based or offering "readings" that are tantamount to a half-page list of bulleted points. This may be convenient from a design perspective, but it is deleterious from a learning perspective. It is imperative that teachers be able to read text that is long and complex and be able to understand the main themes of such text, analyze these themes, and distinguish between fact and opinion (Carr, 2011; Schleicher, 2018; Wolf, 2018; see Figure 1.2 in Chapter 1). Online learning designers may not do learners any favors by reducing readings to a collection of lists and bullet points.

A number of reading techniques for adults can begin to address this. One is the College Board's SQ3R adult reading technique,[5] which can be used to help online learners better comprehend written text. This technique comprises five steps:

1. *scanning* the text to get a general overview of content;
2. *questioning,* noting any questions one has about the text as a whole or about particular vocabulary;

[5] Although developed in 1946, SQ3R has held up well according to research. For more information on the method, visit https://e-student.org/sq3r-study-method/

3. active *reading*, carefully reading the text and making written notations;
4. *reciting*, mentally reciting and summarizing the main points of that section after reading it; and,
5. *reviewing*, in this case with a partner, the main points of the text.

The point is not to emphasize one approach over another, but to recognize that in a distance learning medium, teachers, like students, may need an array of remedial supports to complete a course of study successfully.

### 14.4.9 Provide Technology Training and Support

The myth of the "digital native" has convinced online program designers that young pre-service and in-service teachers are technology wizards and older teachers are technology Luddites. Neither of these stereotypes is true (Burns, in press; Ng, 2012; Pota et al., 2021). Teachers at both the pre-service and in-service levels require training in the technology tools they will use to learn via distance. Many times, though, the technology instruction may be overly expansive and decontextualized from the learning experience as a whole. While potential learners do need instruction in the technology they will use, it should be just enough, just in time, and job-embedded (see Figure 14.1).

**Figure 14.1**
**The 5Js of Technology Training**

The 5Js are a mnemonic that help educators focus on essential practices to help teachers learn technology:

1. **Job-related:** Focus on the core competencies of the classroom, not just on the technology.
2. **Just enough:** Emphasize increased comfort, not proficiency, with computers. Focus on 1–3 techniques, no more, for using a particular application.
3. **Just in time:** Provide teachers with technology training as needed and when needed.
4. **Just in case:** Encourage teachers to plan for contingencies in case the technology fails.
5. **Just try it:** Apply enough pressure and support to compel teachers to try with their students one simple thing they've learned in their professional development (Burns & Dimock, 2007).

This technology training must be accompanied by technology support for online learners. Online courses and programs have to provide live or just-in-time technical support. Asynchronous courses, in particular, must make available a support person or tutor who can help struggling learners with difficulties they may encounter with technology, as well as with content, directions, or an assignment.

### 14.4.10 Use LMS Analytics as an "Early Warning System" to Support Struggling Learners

Learning management systems (LMSs) generate a range of analytics (e.g., enrolment, log-ins, assignment submissions, time spent on an assignment), as well as discussion forums, emails, tests, and quizzes. These data can be used as part of an early warning alert system to tailor and automate supports for learners who fall behind. Within the LMS, the instructor can set up a number of conditions learners must meet in order to attain academic success; send alerts to the online instructor about a learner's status; and trigger automatic responding interventions directed to the "at-risk" learner (e.g., assigning more personalized instruction, tutoring, or a face-to-face or phone meeting). Such assistance helps the online instructor become aware of an online learner's struggles and can automate a set of stepwise system supports—such as, technical reminders to direct instructor intervention—for struggling online learners to help them complete the course.

## 14.5 Conclusion

Distance education programs must take care to focus as much on human beings as they have on technology. They must help both learners and their instructors develop the knowledge, skills, readiness, and dispositions to be active and successful members of an online community of learners and practitioners.

As we learned during emergency remote learning in 2020, learning is a highly social experience, and distance learners need and want to learn with their peers. Even if the primary mode of online instruction is asynchronous, it is important to build a surrounding sense of community so that online learners can share ideas, ask questions, and support one another (Bawa, 2016; Burns, 2013; LaPointe & Reisetter, 2008). That community, and how to design it, is the focus of the next chapter.

Citation: Burns, M. (2023). Preparing Distance Learners. In *Distance Education for Teacher Training: Modes, Models and Methods.* (2nd Edition). Washington, DC: Education Development Center.

## References

Acosta, A., Palmer, I., & Romo-González, L. (2021). *Back to basics: Quality in digital learning.* New America: Education policy. https://www.newamerica.org/education-policy/reports/back-to-basics/

Arnett, T. (2021, May 13). Self directed learning: Niche approach or powerful innovation? *The Christensen Institute*. https://www.christenseninstitute.org/blog/self-directed-learning-niche-approach-or-powerful-innovation/

Bandura, A. (1997). *Self-efficacy: The exercise of control.* W.H. Freeman Publishing.

Barab, S., Thomas, M., & Merrill, H. (2001). Online learning: From information dissemination to fostering collaboration. *Journal of Interactive Learning Research, 12*(1), 105–143. https://www.semanticscholar.org/paper/Online-Learning:-From-Information-Dissemination-to-Barab-Thomas/fae21aec32df4a98334cdc081f11800d78033e38

Barbour, M. (2014). Training teachers for a virtual school system: A call to action. *K-12 Education: Concepts, Methodologies, Tools, and Applications*, 1398–1415. https://www.igi-global.com/chapter/training-teachers-for-a-virtual-school-system/88223

Bawa, P. (2016). Retention in online courses: Exploring issues and solutions—A literature review. *Sage Open, 6*(1), https://doi.org/10.1177/2158244015621777.

Berry, S. (2017). *Educational outcomes of synchronous and asynchronous high school students: A quantitative causal-comparative study of online algebra 1* [Doctoral dissertation Northeastern University].

Burns, M. (2010, February). 17,000 islands, 1 goal: Indonesia turns to online resources to create a newtork of school-based coaches. *The Learning Professional, 31*(1), 18–23. https://learningforward.org/journal/technology/17000-islands-1-goal/

Burns, M. (2013, December). Staying or leaving? Designing for persistence in an online educator training program in Indonesia. *Open Learning: The Journal of Open and Distance Learning, 28*(2), 141–152. doi: http://dx.doi.org/10.1080/02680513.2013.851023

Burns, M. (2016a). Ignoradas y subutilizadas: Estrategias para incrementar la retención en programas en línea. In G. Kelchtermans, *Formación de formadores y educación de calidad como generadora de cambio* (pp. 115–138). Katholieke Universiteit Leuven and Universidad Nacional de Educación de Ecuador.

Burns, M. (2016b, November 22). *Five strategies to deepen student collaboration.* Edutopia. https://www.edutopia.org/article/5-strategies-deepen-student-collaboration-mary-burns

Burns, M. (2019, September 14). *Shedding our disinhibitions (Part 1 of 2).* eLearning Industry. https://elearningindustry.com/shedding-our-disinhibitions-part-1-of-2

Burns, M. (2021). *Background paper prepared for the 2023 Global Education Monitoring report, Technology and education: Technology in education.* United Nations Educational, Scientific and Cultural Organization. https://unesdoc.unesco.org/ark:/48223/pf0000378951

Burns, M. (in press). *Barriers and supports for technology integration: Views from teachers. Background chapter prepared for the Global Education Monitoring report: Technology and education.* United Nations Educational, Scientific and Cultural Organization.

Carr, N. (2011). *The shallows.* WW Norton.

Chen, K., & Jang, S. (2010). Motivation in online learning: Testing a model of self-determination theory. *Computers in Human Behavior, 26*, 741–752. doi:10.1016/j.chb.2010.01.011

Chen, M., Tseng, W., & Hsiao, T. (2018, January). The effectiveness of digital game vocabulary learning: A framework-based view of meta-analysis. *British Journal of Educational Technology, 49*(1), 69–77. doi:http://dx.doi.org/10.1111/bjet.12526

Edisherashvili, N., Saks, K., Pedaste, M., & Leijen, Ä. (2022, January). Supporting self-regulated learning in distance learning contexts at higher education level: Systematic literature review. *Frontiers in Psychology, 12*(792422–792422), 1–21. https://doi.org/10.3389/fpsyg.2021.792422

Escueta, M., Nickow, A., Oreopoulos, P., & Quan, V. (2020). Upgrading education with technology: Insights from experimental research. *Journal of Economic Literature, 58*(4), 897–996. doi:10.1257/jel.20191507

Garrett, R., Simunich, B., Legon, R., & Fredericksen, E. (2021). *CHLOE 6: Online learning leaders adapt for a post-pandemic world, The changing landscape of online education, 2021.* Quality Matters. https://www.qualitymatters.org/qa-resources/resource-center/articles-resources/CHLOE-6-report-2021

Gray, J., & DiLoreto, M. (2016). The effects of student engagement, student satisfaction, and perceived learning in online learning environments. *International Journal of Educational Leadership Preparation, 11*(1). https://files.eric.ed.gov/fulltext/EJ1103654.pdf

Hanson, M. (2022, June 17). *College dropout rates*. Education Data Initiative. https://educationdata.org/college-dropout-rates

Harrell, I., & Bower, B. (2011, August 30). Student characteristics that predict persistence in community college online courses. *American Journal of Distance Education, 25*, 178–191. https://doi.org/10.1080/08923647.2011.590107

Holder, B. (2007). An investigation of hope, academics, environment, and motivation as predictors of persistence in higher education online programs. *Internet & Higher Education, 10*(4), 245–260. doi:DOI:10.1016/j.iheduc.2007.08.002.

Hoxby, C. (2017). Online postsecondary education and labor productivity. In C. Hulten, & V. Ramey (eds.), *Education, skills, and technical change: Implications for future US GDP growth* (pp. 401–460). University of Chicago Press.

Johnson, D., Johnson, R., & Holubec, E. (1990). *Cooperation in the classroom.* Interaction Book Company.

Kahneman, D. (2011). *Thinking, fast and slow.* Farrar, Straus and Giroux.

Keegan, D. (1996). *Foundations of distance education.* Routledge.

Kizilcec, R. F., Reich, J., Yeomans, M., Dann, C., Brunskill, E., Lopez, G., . . . Tingley, D. (2020, June 30). Scaling up behavioral science interventions in online education. *Proceedings of National Academy of Sciences of the United States of America, 117*(26). https://www.pnas.org/content/117/26/14900

Kizilcec, R., & Halawa, S. (2015). Attrition and achievement gaps in online learning. *Proceedings of the second ACM conference on learning at scale*, (pp. 57–66). https://doi.org/10.1145/2724660.2724680

Knowles, M. (1975). *Self-directed learning: A guide for learners and teachers.* Association Press.

LaPointe, L., & Reisetter, M. (2008). Belonging online: Students' perceptions of the value and efficacy of an online learning community. *International Journal on E-learning, 7*(4), 641–665. https://www.learntechlib.org/primary/p/24419/

Latchem, C., & Jung, I. (2010). *Distance and blended learning in Asia.* NY: Routledge.

Laurillard, D. (2016, April). The educational problem that MOOCs could solve: Professional development for teachers of disadvantaged students. *Research in Learning Technology, 24*, 1–17. https://doi.org/10.3402/rlt.v24.29369

Lieberman, C. (2019, March 26). Why you procrastinate (It has nothing to do with self-control). *New York Times*. https://nyti.ms/2HWzAg2

Lowe, S. (2005). Responding to learner needs in distance education: Providing academic and relational support (PARS). In S. Levine (Ed.), *Making distance education work: Understanding learning and learners at a distance* (pp. 73–87). LearnerAssociates.net.

Mandernach, B., Donnelli, E., & Dailey-Hebert, A. (2006). Learner attribute research juxtaposed with online instructor experience: Predictors of success in the accelerated, online classroom. *The Journal of Educators Online, 3*(2), 1–17. https://tinyurl.com/4jua2m7b

McAleavy, T., Hall-Chen, A., Horrocks, S., & Riggall, A. (2018). *Technology-supported professional development for teachers: Lessons from developing countries.* Education Development Trust. https://www.educationdevelopmenttrust.com/EducationDevelopmentTrust/files/34/3463d85a-031c-4f1e-9002-969b4daf4cdf.pdf

McVay, M. (2000). *Developing a web-based distance student orientation to enhance student success in an online bachelor's degree completion program* [Unpublished practicum report presented to the Ed.D. Program, Nova Southeastern University, Florida.]

Ng, W. (2012). Can we teach digital natives digital literacy? *Computers & Education, 59*(3), 1065–1078. https://doi.org/10.1016/j.compedu.2012.04.016

Park, J., & Choi, H. (2009). Factors influencing adult learners' decision to drop out or persist in online learning. *Journal of Educational Technology & Society, 12*(4), 207–217. http://www.jstor.org/stable/jeductechsoci.12.4.207

Perraton, H., Creed, C., & Robinson, B. (2002). *Teacher education guidelines: Using open and distance learning.* United Nations Educational, Scientific and Cultural Organization: https://unesdoc.unesco.org/ark:/48223/pf0000125396

Pota, V., Hennessy, S., Koomar, S., Kreimeia, A., Zubairi, A., Aerts, C., & Gault, C. (2021). *Turning to Technology: A global survey of teachers' responses to the COVID-19 pandemic.* T4. https://t4.education/t4-insights/reports/turning-to-technology

Potashnik, M., & Capper, J. (1998). *Distance education: Growth and diversity.* World Bank.

Price, L., Richardson, J., & Jelfs, A. (2007). Face-to-face versus online tutoring support in distance education. *Studies in Higher Education, 32*(1), 1–20. https://doi.org/10.1080/03075070601004366

Reich, J., & Ruipérez-Valiente, J. (2019). The MOOC pivot. *Science, 363*(6423), 130–131. DOI: 10.1126/science.aav7958

Rizvi, S., Rienties, B., Rogaten, J., & Kizilcec, R. (2020). Investigating variation in learning processes in a FutureLearn MOOC. *Journal of computing in higher education, 32*(1), 162–181. https://doi.org/10.1007/s12528-019-09231-0

Santally, M. (2016). An evaluation of the African leadership in ICT programme from a quality assurance perspective. *European Journal of Open, Distance and E-learning, 19*(2), 114–128. https://files.eric.ed.gov/fulltext/EJ1138166.pdf

Schleicher, A. (2018). *PISA 2018: Insights and interpretations.* http://www.educationduepuntozero.it/wp-content/uploads/2020/01/tabelleOCSEFierli.pdf

Sirois, F., & Pychyl, T. (2013). Procrastination and the priority of short-term mood regulation: Consequences for future self. *Social and Personality Psychology Compass, 7*(2), 115–127. https://doi.org/10.1111/spc3.12011

Smith, B. (2010). *E-learning technologies: A comparative study of adult learners enrolled on blended and online campuses engaging in a virtual classroom* [Doctoral dissertation, Capella University]. https://www.proquest.com/openview/56d6f1c674d4484bfb6f2c2fca0d37c2/1?pq-origsite=gscholar&cbl=18750

Spitzer, M., Gutsfeld, R., Wirzberger, M., & Moeller, K. (2021). Evaluating students' engagement with an online learning environment during and after COVID-19 related school closures: A survival analysis approach. *Trends in Neuroscience and Education, 25*. https://doi.org/10.1016/j.tine.2021.100168

Stanford-Bowers, D. (2008, March). Persistence in online classes: A study of perceptions among community college stakeholders. *Journal of Online Learning and Teaching, 4*(1), 37–50. https://jolt.merlot.org/vol4no1/stanford-bowers0308.pdf

Stephen, J., & Rockinson-Szapkiw, A. (2021). A high-impact practice for online students: The use of a first-semester seminar course to promote self-regulation, self-direction, online learning self-efficacy. *Smart Learning Environments, 8*(6), 1-18. https://doi.org/10.1186/s40561-021-00151-0

Suler, J. (2004). The online disinhibition effect. *Cyberpsychology & Behavior, 7*(3). https://bit.ly/2ua6yEs

Wiens, P., Zizzi, C., & Heatwole, C. (2022). Instructional Grouping Theory: Optimizing Classrooms and the Placement of Ranked Students. *Educational Practice and Theory, 44*(1), 5-21. https://doi.org/10.7459/ept/44.1.02

Wolf, M. (2018, August 25). Skim reading is the new normal. The effect on society is profound. *The Guardian*. https://bit.ly/2BMd3Bb

Zimmerman, B. (2011). Motivational sources and outcomes of self-regulated learning and performance. In B. Zimmerman, & D. Schunk (eds.), *Handbook of self-regulation of learning and performance* (pp. 49–64). Routledge.

Section II. Chapter 15

# BUILDING COMMUNITY

## Table of Contents

**Best Practice:** Successful distance education programs focus on building strong teacher communities.

## 15.1 Overview

There are numerous models of distance-based instruction and professional development. But teachers or teacher-candidates who wish to acquire new knowledge, learn new skills, and adapt their practice may be best served through a community approach that encourages learners to view model practices (in person or via video), practice using new approaches in their particular classroom setting, and regularly and critically reflect on their teaching, either while it happens or after the fact (Blitz, 2013; Burns & Dimock, 2007; Jimenez-Silva & Olson, 2012).

In studies of professional development across the globe, teachers consistently report that the most valuable benefits of online learning are those that relate to the social context of learning: "sharing information and knowledge" and "interacting with colleagues" (Voogt & Tondeur, 2015, as cited in Hennessy et al., 2022; Burns, in press). The majority of teachers indicate that the support they receive from other teachers in online discussions is very important to them (Burns, in press). As mentioned in the previous chapter, being part of an online community is linked to teacher satisfaction with their distance learning courses—and being part of a school-based community of teachers is linked to school change (Gray & DiLoreto, 2016; Hord et al., 2006).

The prominence of collegiality and community is not exclusive to online modes of distance education nor is it a recent phenomenon. Decades ago, teachers Zimbabwe and Sri Lanka cited the centrality of study groups, learning circles, and contact sessions as critical to their satisfaction with and success in print- and radio-based distance education programs (Perraton, 1993). In face-to-face professional development settings, particularly those involving learning technology, teachers have long pointed to a community of peers as critical to satisfaction with professional development (Blitz, 2013; Burns & Dimock, 2007; Dimock et al., 2001; Jimenez-Silva & Olson, 2012; South African Institute of Distance Education, 2005).

This chapter discusses the importance and formation of online learning communities for teachers as part of any distance learning program.

## 15.2 Types of Communities

Communities are groups of people bound together through shared connections that "transform individuals from a solitary status to membership of an identifiable group" (Lloyd & Duncan-Howell, 2010, p. 61). Their identities are defined by roles they play and the relationships they have within the community (Riel & Polin, 2004).

*Professional learning communities of teachers* are open and voluntary gatherings of small groups of teachers concerned with the general practice of teaching or specialist disciplines or areas of interest. Their cohesion is driven from regular interactions or "mere exposure" (Zajonc, 1968), through frequent meeting up, knowledge sharing, joint study, and developing new practices built on shared purpose, behavioral norms, and routines (Duncan-Howell, 2010; Riel & Polin, 2004, p.18).

Lloyd & Duncan-Howell (2010) argue that a community of teachers is, by definition, a *community of practice*—the most evolved and structured form of a professional learning community (p. 61). Wenger (1998) defines communities of practice as being organized around three dimensions:

1. **Joint enterprise –** An agreed-upon, negotiated purpose or goal with mutual accountability
2. **Shared repertoire –** Distinctive discourse framing a shared understanding of concepts, tools, and resources of practice
3. **Mutual engagement –** Common activity of participants playing distinctive roles in this joint work

Thus, a community of practice instantiates learning as both "a kind of action and a kind of belonging" (Wenger, 2009, as cited in Du Plessis and Muzaffar, 2010, p. 4). Chiu et al. (2007) place Wenger's description firmly in the virtual realm noting that online communities of practice consist of three "crucial" components: knowledge, people, and a social network. It is this knowledge-exchange through trusted and valued relationships that essentially motivates people to join online communities.

### 15.2.1 Online Communities

Within a professional learning community, technology can serve as a means for both communication and collaboration, through which teachers can create and become part of evolving and multiple networks of colleagues, some of whom they know and more of whom they have not yet met. Thanks to technology, there is a plethora of types of online communities. These span more loosely structured communities, such as personal learning networks or communities of interest, to professional learning communities to highly structured communities of practice.

Online communities of all types have emerged as an effective and cost-effective response to teachers' needs for professional development and support. In addition to their type, mentioned in the previous paragraph, online communities are extraordinarily diverse in their attributes. They can be voluntary or mandatory; arranged horizontally (e.g., composed of educators of the same level in the system) or vertically (e.g., educators who occupy different levels of the education system); they can be work-focused or socially driven; they can be facilitated or unfacilitated; and they can be created by a distance program or organically formed (Baptista & Sherman, 2018). They may vary in their affiliation, size, and openness. Examples of Web-based or mobile-based communities may include the following:

- *Organic, teacher-driven, small informal communities*, such as *WhatsApp* and *Facebook* teacher groups. These often are created by teachers who teach in the same school or district and are generally smaller in size. They are not part of any formal teacher professional development initiative. Many preceded the COVID-19 pandemic school lockdowns but thrived during and after the pandemic (British Council, 2015; Burns, in press). Other examples include teacher refugee communities in Syria, Malaysia, and Bangladesh, where interaction occurs via *Facebook* and *WhatsApp* (Jordan & Mitchell, 2020).
- *Communities that are part of a formal professional development initiative.* For example, Teachers for Teachers, discussed in Chapter 6, is typical of these types of communities. It is part of a larger, formal professional development initiative and thus smaller and more restricted in membership because of this affiliation (Mendenhall et al., 2017).
- *Large-scale, open but bounded networks.* One example is the Organization of American State's (OAS's) Inter-American Teachers Education Network (ITEN). ITEN partners with OAS member states' ministries of education and teacher education institutions to provide face-to-face, blended, and online professional development to a network of approximately 50,000 teachers in the Americas. Any teacher in any OAS country may join, regardless of

whether or not he or she has participated in any of the formal TPD offerings, but the community is closed to non-OAS country teachers (Organization of American States, 2022).

- *Large-scale, open, and affiliated networks.* These are membership-driven but open to dues-paying members anywhere. Examples include the International Society of Technology in Education (U.S.-based) and the Association for Learning Technology (UK-based). They offer large undifferentiated groups as well as special interest groups (SIGs) on a variety of topics.
- *Large-scale, completely open, unaffiliated Web communities or social media groups*. These are often formally organized and administered, although unaffiliated with any particular professional development initiative or region. They are thus open to all teachers anywhere. Examples include *We Are Teachers, Classroom 2.0,* or the Facebook *Educators Network* site.

Unlike many formal professional development courses, online communities tend to focus on practice-based and informal learning. If provided with the time, support, and resources, teachers in an online community may co-develop lesson plans together; share curriculum ideas; plan online collaborative projects; discuss pedagogy, classroom management, assessment, or content-related topics; post experiences, lessons learned, or self-assessments; and engage in peer mentoring. The benefits of these activities increase when teachers are *also* engaged in structured teacher training and/or professional development programs (Gaible & Burns, 2007, p. 64; see also Duncan-Howell, 2010).

### 15.2.2 Benefits of Professional Learning Communities

Online technologies offer several important benefits for community formation: They are flexible, convenient, and unconstrained by time or place (Barab et al., 2001); they broaden learning and understanding beyond the classroom; they connect teachers with like-minded colleagues who share similar interests and passions; they can extend the work of an offline community of practice (Baptista & Sherman, 2018); and they allow members to benefit from "the strength of weak ties" (Granovetter, 1973). Teachers report that these interactions with new colleagues are beneficial because they provide broader social interaction and make it possible for teachers to acquire new knowledge from people with whom they would not normally interact (Duncan-Howell, 2010). (*Chapter 5: Online Learning* discusses in detail the technology tools that can promote online communities of practice.)

Professional learning communities—online, blended, mobile, and in-person—more broadly share several tangible attributes that have a direct impact on teacher education programs, both distance and face-to-face, and on the quality of instruction in schools.

- They provide continuous and self-generating professional development for teachers through flexible, authentic, and personalized opportunities for learning (Duncan-Howell, 2010; Perry et al., 2021).
- They reinforce and sustain many of the skills, concepts, and strategies promoted in teacher training or professional development sessions (Blitz, 2013; Burns & Dimock, 2007).
- By collaborating with colleagues, teachers can customize, personalize, and adapt new skills and concepts to their particular setting, enlisting colleagues to help them critique and improve implementation of a particular idea or strategy (Chiu et al., 2007).
- They can promote problem-solving and innovation and nurture a public repertoire of agreed-upon best practices at a particular school or set of schools (Burns & Dimock, 2007; Duncan-Howell, 2010; Wenger-Trayner & Wenger-Trayner, 2011).
- They can help promote a sense of collective efficacy among teachers—a belief by teachers as a staff that they have the skills to make a positive difference in student learning (Donohoo, 2017, p. 3).

- They increase the social capital of a school; that is, the school as a whole may function better because the collective ties of its members lead to an improvement in the common good of the school (Burns & Dimock, 2007).
- Teachers who collaborate online are engaged with the group, develop a sense of collegiality, improve their knowledge of subject and pedagogical content, and intend to modify their instructional practices accordingly (Blitz, 2013; Dikkers, 2018).
- Creating supportive environments for teacher collaboration encourages teachers to engage in informal leadership roles, thus creating "a pipeline for future teacher leaders" (Teacher Leadership Consortium, 2011).
- Within a community of practice, isolation is replaced by an ethos of collegiality, sharing, and collaboration—all of which make teachers feel more successful, both individually and collectively (Burns & Dimock, 2007; Dikkers, 2018; Hord et al., 2006).
- Primary and secondary school teachers with a history of sharing, or university faculty who have collaborated on articles and projects, are more comfortable engaging in the sorts of practices that promote community and school improvement, such as online and offline collaboration, sharing resources and ideas with teachers, and help-seeking behaviors (Nistor et al., 2012; Riverin & Stacey, 2008).

There are a number of globally recognized communities of practice that can serve as exemplars for distance programs or education entities wishing to develop a professional learning community model. These programs are typically part of formal professional development efforts. Singapore's Teachers Network learning circles involve between 4 and 10 teachers and a facilitator who meet monthly to solve common problems using action research methods (Academy of Singapore Teachers, n.d.). Across Japan, a lesson study approach (discussed in Chapter 9) involves teams of teachers who prepare and teach different lessons, observe one another's lessons, provide feedback, and work together to review.

## 15.3 Developing Communities of Practice

Research on professional learning communities in general and online communities specifically is still fairly fragmented (Blitz, 2013). Thus, many recommendations for promoting effective professional learning communities are the same for online, blended, and in-person modalities. Because *communities of practice* are often the most difficult types of communities to form (see Figure 15.1, below), this section focuses on fostering and nurturing communities of practice via the following strategies.

### 15.3.1 Understand the Distinctions among Communities and Help Learners through the Stages of Community Formation

Three misconceptions persist in relation to the idea of community formation among teachers. First, community of any sort does not develop *ex nihilo*—it must be carefully planned, designed, and cultivated (Wenger-Trayner & Wenger-Trayner, 2011). Next, in much of the literature on community formation, terms such as "community," "professional learning communities," "communities of learners," and "communities of practice" remain ill-defined, erroneously conflated, and used interchangeably. Third, in the research on teacher change and teacher professionalism (Hord et al., 2006), "community" is often defined as an end in and of itself. Yet not all communities are similar nor are they equal, as Figure 15.1 demonstrates.

Broadly and briefly, communities often begin as collections of individuals who come together around a *shared interest*. If support, time, resources, frequent opportunities for learning, and emphasis on continuing and outside-the-course learning are built into the distance learning program, these communities of interest can become *communities of learning.* If learners are encouraged to work together to implement a new idea in their classroom or in micro-teaching; shown how to collaborate; given time, resources, and the support of a skilled facilitator to begin putting into practice what they have learned; and if they are assessed—not for the purposes of judging or evaluating their initial efforts but for the purpose of improving and reinforcing their efforts—learners can move toward formation of a *community of practice*.

The progression is not as linear as defined here, nor will every community need to be a community of practice, but it is important to understand these distinctions so that distance learning programs can envision and intentionally design their desired community and thus support teachers through these stages of community formation (Burns & Dimock, 2007).

Communities can certainly come together virtually, but some form of face-to-face interaction is often necessary for groups to really cohere (Perry et al., 2021). This is particularly true for individuals who have not experienced a professional community and/or who are new to the whole experience of online learning, especially when collaborating with peers in different locations.

### 15.3.2 Pay Careful Attention to the Initial Stage of Community Development

The initial stage of community is critical to subsequent stages because it is at this crucial point that the teacher is persuaded or propelled into embracing professional development's learning activities—or rejecting them. Thus, distance education programs must devote particular attention to this initial stage, focusing on the following areas.

**Content (Domain).** For teachers, professional development and engagement require interaction with ideas about education, classroom practice, and their personal beliefs (Girvan et al., 2016). Thus, the "what" (or the domain or content) is a critical driver of teacher communities (Chiu et al., 2007). Content should address the needs of all stakeholders involved in teaching and learning. It should be authentic and directly related to teachers' concerns and be "sympathetic" to their specific needs as learners (Duncan-Howell, 2010, p. 325). A facilitator may narrow the scope of a given community of learning or practice to make it as relevant as possible and to help generate deeper discussion around a set of topics (Baptista & Sherman, 2018, p. 5).

**People.** Because communities of practice require extensive planning to be beneficial, the group must identify members who will take the lead to support planning and execution and empower these members (Wenger-Trayner & Wenger-Trayner, 2011). Domain knowledge and individual feelings of expertise strongly predict participation in a professional community, but all members must be treated as having expertise (Baptista & Sherman, 2018; Nistor et al., 2012). Measures that assess team dynamics—such as work routines, communication, group norms, leadership styles—and how well a professional learning community reaches their goals can aid in designing and implementing learning communities and communities of practice (Blitz & Schulman, 2016, p. 4).

**Practices.** Practices recommended in research literature include promoting interaction by structuring collaboration; providing opportunities for participants to shape the goals, structure, and assessment of the collaboration; allowing groups to develop their own guidelines for co-learning and interaction (pairing expert learners with less experienced learners, for example); peer assessment; and designing activities that promote self-reflection (Commonwealth of Learning, 2008; Girvan et al., 2016; Laurillard, 2016; Lloyd & Duncan-Howell, 2010).

**Protocols.** As discussed in Chapter 13, protocols are scripts or a set of prescribed steps or prompts to structure focused, intentional, and deliberative conversations. They are particularly helpful when groups are forming and can help to keep conversations professional and neutral. There are numerous protocols that professional learning communities of practice can use depending on the purpose of the conversation. *Tuning*

**Figure 15.1**
**Types of Communities and Their Characteristics (Burns & Dimock, 2007)**

| | Community of Interest | Community of Learning | Community of Practice |
|---|---|---|---|
| **Purpose** | • Teachers connect to one another via a shared professional interest. | • Teachers come together around a "joint enterprise"— to learn about a particular concept, skill, or tool. | • Teachers come together around a "joint enterprise"—but they plan and implement a particular concept, skill, or tool.<br>• The goal is to develop a body of shared practical knowledge (domain) that can be jointly implemented. |
| **Formation** | • Initial stage of community formation.<br>• Loosely formed, largely informal, little internal coherence.<br>• May be formed with the support of external actors (institution leader or professional development providers).<br>• Though formally sanctioned, they may not have norms, or enforced norms, rules or activities designed to achieve specific goals. | • More developed stage of community formation.<br>• More formal with greater internal coherence.<br>• May be formed with the support of external actors (institution leader or professional development providers), but the impetus is sustained by activities and motivations of group members.<br>• Formally sanctioned, continuous networks with norms, rules and activities designed to achieve specific goals. | • Most developed stage of community formation.<br>• Highly formal and a high degree of internal coherence.<br>• May be formed with the support of external actors (institution leader or professional development providers), but the impetus is driven by joint activities and the motivation of group members.<br>• Formally sanctioned, continuous networks with norms, rules and activities designed to achieve specific goals. |
| **Orientation** | • May or may not be (explicitly) goal oriented. | • Goal-oriented. | • Goal-oriented. |
| **Focus** | • On the interest or innovation itself.<br>• Emphasis is on gathering information and making connections for the purposes of self-knowledge or to share with colleagues. | • Explicit emphasis is on learning (situated and otherwise), knowledge construction, and metacognition.<br>• While there may be an *expectation* of implementing what is learned, this expectation may not be explicit or operationalized. | • The emphasis is explicitly on application: putting learning into practice, implementation, and shared action.<br>• While learning is emphasized, application of learning is the real, understood focus.<br>• There may be mechanisms and protocols in place to ensure this shared implementation. |

| | Community of Interest | Community of Learning | Community of Practice |
|---|---|---|---|
| **Interaction** | • Characterized by loose-to-moderate ties among group members.<br>• May or may not meet on a regular basis.<br>• Characterized along a continuum of interactions from communication to cooperation to collegiality.<br>• Interactions are often intermittent and not governed by any recognized norms.<br>• May be some degree of reciprocity (i.e., individuals exchange ideas and help one another for mutual benefit). | • Characterized by moderate-to-strong ties among group members.<br>• Highly formed and may meet on regular basis for purposes of mutual learning.<br>• Characterized along a continuum of interactions from cooperation to collegiality to collaboration.<br>• Higher degree of reciprocity.<br>• Formal and informal norms of interaction may be enforced by group members. | • Characterized by strong ties among group members.<br>• Highly formed and meets regularly for purposes of collaboration.<br>• Characterized by ongoing collaboration and joint implementation.<br>• Highest degree of reciprocity.<br>• Formal and informal norms of interaction are enforced by group members.<br>• Distinguished by the strength and depth of the culture that it establishes and which, in turn, supports it (Riel & Polin, 2004, p. 18) |
| **Primary activities** | • Investigation and exploration of skill, concept, or tool.<br>• Sharing resources or experiences. | • Deeper investigation of skill, concept, or tool, with the understood goal of application.<br>• Sharing resources, experiences, and ideas about practice. | • Deeper investigation and application of skill, concept, or tool.<br>• Sharing resources, experiences, and ideas about practice.<br>• May involve parallel teaching, co-teaching, or peer observation and feedback. |
| **Duration** | • May be short-lived or dormant, recurring as added information about a particular interest emerges or as a new innovation is presented. | • Sustained over the life span of the professional development or course of instruction.<br>• May continue beyond the life of the course of instruction but often requires external or sustained intervention. | • Has the greatest chance of continuing beyond the life of the course of instruction if collaboration becomes the norm, but these, too, can dissipate when the focus on the domain concludes.<br>• Duration possibly linked to sustained or external intervention. |

*protocols* can help with planning. Other protocols include *warm and cool feedback* (for critiquing a colleague's work), the *consultancy protocol* (to address a problem), or a *critical friend* [1] conversation protocol (also for feedback or idea generation). Two excellent resources for these and other protocols are the School Reform Initiative (where the previous protocols reside) and the National School Reform Faculty.[2]

### 15.3.3 Organize Learners into Cohorts and Design Frequent Opportunities for Interaction with the Instructor and Peers

As mentioned in Chapter 7, the most successful distance education models have moved from the model of the solo learner to those based on learners as part of a community. As noted in Chapter 14, online teacher-learners report that peer-based online learning is "deeper and more meaningful" than non-peer-based online learning experiences (Burns, 2013; Gray & DiLoreto, 2016).

Frequent study groups, get-togethers, co-planning, or observation sessions have been features of successful print- and audio-based distance education courses (Perraton, 1993). As mentioned in Chapters 13 and 14, increased interaction with online instructors and classmates—face-to-face, blended, and online—lowers attrition rates and increases satisfaction rates associated with an online course of study.

While cohorts are important, also important is a strategy for grouping a certain cohort of teachers. For instance, teachers may be organized as follows:

1. *Homogeneously.* Sharing a particular set of characteristics or abilities, such as geographic proximity, or similar grade-level, performance-level, or status (e.g., novice teachers)
2. *Heterogeneously.* Representing diversity of the above characteristics in tiered groups (more, less, and least expert)
3. *Randomly.* For evaluation purposes[3]

There are advantages and disadvantages to each grouping strategy. Much of the research appears to argue for organizing teacher-learners as *mixed-ability* groups with a range of abilities in a particular area—for example, content knowledge. Jackson & Bruegmann (2009), in their study of "knowledge spillovers" among teachers, report that new teachers benefit most from exposure to high-ability peers. Teachers who are more likely to reflect on experiences that focus on classroom teaching are more likely to report a change to their professional practice than those who do not (Camburn & Han, 2015).

### 15.3.4 Focus on Collaboration as Part of Course Design to Stimulate Community

Collaboration and community may not come naturally—particularly in an online environment. It may be more difficult, particularly if teachers operate in educational or cultural environments that emphasize hierarchy, conformity, and/or individuality or if courses are asynchronous.

Yet these ongoing and meaningful interactions and the practice of "working together" are the levers that transform a collection of individuals into a coherent community. However, collaboration is not simply defined by its group-based nature. It has to be designed, taught, and nurtured. Distance education programs can foster a sense of collaboration and community by:

- Making collective learning and the attainment of common goals, versus individual goals, a central feature of the online course or program (Doig & Groves, 2011; Dudley, 2019; Laurillard, 2016)
- Helping community members understand the characteristics of collaboration—positive

[1] A "critical friends" group also can be a type of community of practice or professional learning community.
[2] See https://www.schoolreforminitiative.org/protocols/ and https://nsrfharmony.org/protocols/ Both sites have dozens of free protocols
[3] Refer back to Chapter 14, Section 14.2. For more information on *homogeneous and heterogeneous groupings*, see https://tinyurl.com/5n72xfts

interdependence, promotive interaction, individual and group accountability, interpersonal and small-group skills, and group processing (Johnson et al.,1990)

- Orienting learners about the stages of community formation; what true collaboration involves; how to engage in conflict, come to consensus, avoid free-riding behavior; and how to strengthen and stretch their expertise (Burns, 2016)
- Ensuring that instruction is learner-centered (Commonwealth of Learning, 2008)
- Integrating collaboration into course standards, activities, assignments, and assessments so that learners share and leverage knowledge to achieve learning goals (Burns & Bodrogini, 2011)
- Explicitly scaffolding for learners how to collaborate; this can take place via facilitator modeling or protocols (Baptista & Sherman, 2018; Myung et al., 2020)
- Providing time, structure, and supports for distance education learners and their instructors and among distance education learners (Myung et al., 2020)
- Promoting genuine and meaningful discussions that promote and respect honesty and openness in online, video, audio, or face-to-face modes (Barab et al., 2001)
- Allowing as much time as possible for groups to share information that may not appear immediately related to the tasks at hand (Baptista & Sherman, 2018)
- Incentivizing collaboration and communication via grading, additional points, praise, and recognition for teacher-learners, special designations, or funding for teams of teacher-learners to present at a conference or to school leaders
- Being prepared to de-emphasize the product in favor of developing collaborative skills to permit group members to invest thoroughly in collaborative activities (Commonwealth of Learning, 2008)
- Engaging learners in collaborative planning and projects—these can range from parallel activities, sharing knowledge, or a joint project among teachers in various locations that requires a collaborative effort

### 15.3.5 Choose Technologies That Foster Communication and Collaboration

Human interaction is the key to community formation. Thus, the technology tools provided to learners must support a range of communication types and styles. Two-way audio and interactive video can bring teachers together around a common pursuit. In noninteractive forms of distance education—for example, broadcast radio or television or print-based learning—mobile phones, which allow for low-cost, text-based (SMS) and voice communication, are a successful technology tool used to foster the communication that is the lifeblood of a community.

Within a Web-based environment, learning that is organized around collaborative teams (versus self-study) can foster synchronous and asynchronous communication and multiple forms of interaction. *Asynchronous tools*,[4] such as e-mail, *Slack*, blogs, e-lists, bulletin boards, user groups, or threaded discussions in LMSs, can promote analysis, reflection, and critical thinking of innovative ideas and practices, allowing for deep and meaningful learning to occur (Barab et al., 2001, p. 135).

*Synchronous tools,* such as SMS, messaging services (e.g., *WhatsApp* or *Telegram*), Voice over IP tools (VoIP; e.g., *Skype* or *Facetime*), collaboration platforms (e.g., *Spinndle* and *Trello*), and Web conferencing tools (e.g., *Meet* and *Zoom*), where learners constantly "see" each other but work together in breakout rooms, can amplify personalized interaction. VoIP tools can allow for paired, small-group or large-group real-time discussions around specific teaching practices. Moreover, the uses of such tools for ongoing communication can provide the sort of "high-touch" contact and sense of belonging that may be

[4] We speak here of the design of the tool versus its actual use. Asynchronous tools can be used synchronously and vice versa.

absent in online courses (See Chapter 14) as well as the verbal immediacy and just-in-time assistance, mentioned in Chapter 13, that are critical elements in good online instruction and the coherence of online groups (Burns & Bodrogini, 2011).

The ongoing use of collaborative creation tools—such as *Diigo* for co-annotating readings, Google *Docs* for planning and co-creation, *Padlet* for brainstorming, and *Mahara* to co-construct action research projects—can result in the types of interaction with knowledge, practice, and online colleagues that Wenger has identified as critical to the formation of communities of practice (Wenger, 1998; Burns & Bodrogini, 2011; M. Hooker, personal communication, August 16, 2022; Laurillard, 2016). In addition to such uses, Figure 15.2 outlines a set of structured activities that can be organized in synchronous online interactions.

Using both asynchronous and synchronous tools for communication, teachers can create an automatic archived body of knowledge that may be accessed by others and communicate on an ongoing basis. Community formation can be further enhanced and expanded via collaborative projects, ongoing webinars, and online or virtual teaching and learning conferences. Whatever digital tools are being used, they should be intuitive and easy to use.

**Figure 15.2**
**Online Community Activities**

Baptista & Sherman (2018) suggest the following activities during online community meetings. These activities deliberately invite participation by members.

**Facilitator-led discussion.** The facilitator selects a topic relevant to or suggested by members and provides in-depth resources for discussion.

**Ask an expert.** An internal or external expert shares information on a certain topic and then engages in a question-and-answer session with members.

**Panel discussion.** This is similar to "ask an expert," but with more opportunity to get a diversity of opinions.

**Peer assist.** Members tap the collective knowledge of the group to get recommendations or resources on the topics most relevant to them.

**Shoot the moon.** Members pose questions that may not have ready answers, and the group is given time and space to brainstorm on the issue.

**Sprints.** Members are brought together to accomplish a particular task in a short amount of time—for instance, creating a tool or guidelines that emerged from discussion (Baptista & Sherman, 2018, p. 2).

### 15.3.6 "Create a Community, Not a Classroom"

Establishing strong relationships with learners is critical for online communities as well as for online courses. In addition to the activities proposed in Figure 15.2, the University of Southern California's Rossier School of Education suggests the following list of activities within synchronous online courses to promote online community formation:

- Ice-breaker activities, particularly for the first session, and/or self- or pair-based introductions
- Structuring opportunities to talk about personal contexts, session check-ins, and digital storytelling
- Greeting participants by name as they enter the online classroom
- Checking in and chatting with learners who sign in early; similarly, course instructors can keep the webinar session "open" after it has officially ended to encourage and allow for social interaction on a personal level
- Using the whiteboard feature of Web conferencing tools such as *Zoom* or *Meet* to play games, such as *Pictionary*
- Using webinar platform polling features
- Holding small-group consultations or meetings with learners in breakout rooms

- Before class officially begins, asking participants to engage with the content by posting a warm-up question or idea to connect with their background knowledge on topics that will be discussed, putting responses in the chat, and using these written comments as launching points for the initial discussion (Brenneman & Karpman, 2020, as cited in Myung et al., 2020, pp. 18–19).

Within asynchronous courses, instructors also can pay careful attention to community formation by organizing learners into teams and incorporating opportunities for regularly scheduled meetings and peer feedback. In addition, individualized feedback on assignments, review of content through short videos, or voice and text messages are all ways that educators can provide asynchronous support around individual needs (Myung et al., 2020, p. 45).

## 15.4 Conclusion

Communities of practice offer several benefits to distance learning programs in general and to teachers in particular. First, they furnish the emotional, logistical, and procedural supports for their members in the pursuit of common interests and goals, transforming an undertaking from the individual to the shared realm. As seen in the previous chapter, this can help learners feel part of and valued by the group, and thus they are less likely to drop out of an online course.

Second, communities of practice can result in a purposeful educational network of professionals formed around a "joint enterprise" that serves as a rich source of teachers' collective learning and thus as a larger public good (Duncan-Howell, 2010; Wenger, 1998). Third, by connecting teacher-learners with colleagues whom they know or may not yet know, they make possible goal-oriented knowledge generation and shared learning which is lubricated by the trust, mutual support, and open communication that form the basis of a community. These essential ingredients of community can be facilitated by technology-based opportunities to communicate, cooperate, co-learn, and co-create knowledge and ideas (M. Hooker, personal communication, August 16, 2022). Finally, communities of practice make public the private, embedded, and tacit professional knowledge of individuals within a group, so that knowledge generation is transformed into informed practice that can result in improved instructional change among teachers and within classrooms (Burns & Bodrogini, 2011; Burns & Dimock, 2007; Du Plessis & Muzaffar, 2010; Hord et al., 2006).

Although a powerful professional development tool and absolutely necessary to promote and sustain school-based change, online communities are hard to form and sustain. For that reason, online professional learning communities may be most effective when part of an overall, ongoing structured experience, such as an online program.

A final word: While this chapter has focused on primary and secondary educators, it is important to note that *teacher educators* also benefit from membership in professional learning communities. However, overloaded instructors' schedules, large numbers of student teachers, the absence of a supportive environment for professional development, and a lack of resources often impede the development of these professional communities among teacher educators. Like the teachers they prepare, distance and in-person instructors can benefit from the exchange of ideas, shared experimentation, and the wisdom and "counsel from experienced peers" (Du Plessis & Muzaffar, 2010, p. 1).

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## References

Academy of Singapore Teachers. (n.d.). *Professional learning communities*. Academy of Singapore Teachers. https://academyofsingaporeteachers.moe.edu.sg/professional-excellence/professional-learning-communities

Baptista, Z., & Sherman, T. (2018). *Virtual communities of practice guide.* Education Development Center.

Barab, S., Thomas, M., & Merrill, H. (2001). Online learning: From information dissemination to fostering collaboration. *Journal of Interactive Learning Research, 12*(1), 105–143.

Blitz, C. (2013). *Can online learning communities achieve the goals of traditional professional learning communities? What the literature says (REL 2013–003).* U.S. Department of Education, Institute of Education Sciences, National Center for Educational Evaluation and Regional Assistance, Regional Educational Laboratory Mid-Atlantic. http://ies.ed.gov/ncee/edlabs

Blitz, C., & Schulman, R. (2016). *Measurement instruments for assessing the performance of professional learning communities (REL 2016–144).* U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Mid-Atlantic. http://eric.ed.gov/?id=ED544210

British Council. (2015). *Technology for professional development: Access, interest and opportunity for teachers of English in South Asia.* British Council. https://www.britishcouncil.in/sites/default/files/digital_teachers_report_final_low_res.pdf

Burns, M. (2013, December). Staying or leaving? Designing for persistence in an online educator training program in Indonesia. *Open Learning: The Journal of Open and Distance Learning, 28*(2), 141–152. doi: http://dx.doi.org/10.1080/02680513.2013.851023

Burns, M. (2016, November 22). *Five strategies to deepen student collaboration.* Edutopia. https://www.edutopia.org/article/5-strategies-deepen-student-collaboration-mary-burns

Burns, M. (in press). *Barriers and supports for technology integration: Views from teachers. background chapter prepared for the Global Education Monitoring report: Technology and education.* United Nations Educational, Scientific and Cultural Organization.

Burns, M., & Bodrogini, P. (2011). The wisdom of practice: Web 2.0 as a cognitive and community-building tool in Indonesia. In M. Thomas (Ed.), *Digital education* (pp. 167–193). Palgrave Macmillan.

Burns, M., & Dimock, K. (2007). *Technology as a catalyst for school communities: Beyond boxes and bandwidth.* Rowman & Littlefield.

Camburn, E., & Han, S. (2015). Infrastructure for teacher reflection and instructional change: An exploratory study. *Journal of Educational Change, 16*(4), 511–533. https://doi.org/10.1007/s10833-015-9252-6

Chiu, C., Chiu, C., & Chang, H. (2007). Examining the integrated influence of fairness and quality on learners' satisfaction and web-based learning continuance intention. *Information Systems Journal, 17*, 271–287. https://doi.org/10.1111/j.1365-2575.2007.00238.x

Commonwealth of Learning. (2008). *Education for a digital world: Advice, guidelines and effective practice from around the globe.* http://oasis.col.org/handle/11599/52

Dikkers, A. (2018). Social interaction in K-12 online learning. In K. Kennedy & R. Ferdig (Eds.), *Handbook of research of K12 online and blended learning* (2nd ed.) (pp. 509-522). Carnegie Mellon University ETC Press. https://www.learntechlib.org/p/182993/

Dimock, K. V., Burns, M., Heath, M., & Burniske, J. (2001, December). *Applying technology to restructuring learning: How teachers use computers in technology assisted constructivist learning environments.* Southwest Educational Development Laboratory.

Doig, B., & Groves, S. (2011). Japanese lesson study: Teacher professional development through communities of inquiry. *Mathematics Teacher Education and Development, 13*(1), 77–93. https://files.eric.ed.gov/fulltext/EJ960950.pdf

Donohoo, J. (2017). *Collective efficacy: How educators' beliefs impact student learning.* Corwin Press.

Du Plessis, J., & Muzaffar, I. (2010). *Professional learning communities in the teachers' college: A resource for teacher educators.* EQUIP 1. https://files.eric.ed.gov/fulltext/ED524465.pdf

Dudley, P. (2019). *Lesson study: A handbook.* Lesson Study UK. https://lessonstudy.co.uk/wp-content/uploads/2012/03/new-handbook-revisedMay14.pdf

Duncan-Howell, J. (2010). Teachers making connections: Online communities as a source of professional learning. *British Journal of Educational Technology, 41*(2), 324–340. doi:10.1111/j.1467-8535.2009.00953.x

Gaible, E., & Burns, M. (2007). *Using technology to train teachers: Appropriate uses of ICT for teacher professional development in developing countries.* InfoDev | World Bank. https://documents1.worldbank.org/curated/en/900291468324835987/pdf/396180infoDev01IN0TEACHERS01PUBLIC1.pdf

Girvan, C., Conneely, C., & Tangney, B. (2016). Extending experiential learning in teacher professional development. *Teaching and Teacher Education, 58*, 129–139. https://doi.org/10.1016/j.tate.2016.04.009

Granovetter, M. (1973, May). The strength of weak ties. *American Journal of Sociology, 78*(6), 1360–1368. https://www.journals.uchicago.edu/doi/abs/10.1086/225469

Gray, J., & DiLoreto, M. (2016). The effects of student engagement, student satisfaction, and perceived learning in online learning environments. *International Journal of Educational Leadership Preparation, 11*(1). https://files.eric.ed.gov/fulltext/EJ1103654.pdf

Hennessy, S., D'Angelo, S., McIntyre, N., Koomar, S., Kreimeia, A., Cao, L., . . . Zubairi, A. (2022). Technology use for teacher professional development in low- and middle-income countries: A systematic review. *Computers and Education Open, 3.* EdTech Hub. https://doi.org/10.1016/j.caeo.2022.100080

Hord, S., Rutherford , W. L., Huling-Austin, L., & Hall, G. (2006). *Taking charge of change.* Southwest Educational Development Laboratory.

Jackson, C., & Bruegmann, E. (2009, July). *Teaching students and teaching each other: The importance of peer learning for teachers.* National Bureau of Economic Research Working paper No. 15202. http://www.nber.org/papers/w15202

Jimenez-Silva, M., & Olson, K. (2012). A community of practice in teacher education: Insights and perceptions. *International Journal of Teaching and Learning in Higher Education, 24*(3), 335–348. https://files.eric.ed.gov/fulltext/EJ1000686.pdf

Johnson, D., Johnson, R., & Holubec, E. (1990). *Cooperation in the classroom.* Interaction Book Company.

Jordan, K., & Mitchell, J. (2020). *Messaging apps, SMS & social media: Rapid Evidence Review.* doi:10.5281/zenodo.4058181

Laurillard, D. (2016, April). The educational problem that MOOCs could solve: Professional development for teachers of disadvantaged students. *Research in Learning Technology, 24*, 1–17. https://doi.org/10.3402/rlt.v24.29369

Lloyd, M., & Duncan-Howell, J. (2010). Changing the metaphor: The potential of online communities in teacher professional development. In J. Lindberg & A. Oloffson (Eds.), *Online learning communities and teacher professional development: Methods for improved education delivery* (pp. 60-76). IGI Global.

Mendenhall, M., Bowden, L., Cha, J., Collas, S., Falk, D., French, S., . . . Skinner, M. (2017). *Strengthening teacher professional development: Local and global communities of practice in Kakuma Refugee Camp, Kenya.* https://www.eccnetwork.net/resources/strengthening-teacher-professional-development

Myung, J., Gallagher, A., Cottingham, B., Gong, A., Kimner, H., Witte, J., . . . Hough, H. (2020). *Supporting learning in the COVID-19 context: Research to guide distance and blended instruction.* Policy Analysis for California Education (PACE). https://files.eric.ed.gov/fulltext/ED609208.pdf

Nistor, N., Schworm, S., & Werner, M. (2012). Online help-seeking in communities of practice: Modeling the acceptance of conceptual artifacts. *Computers & Education, 59*(2), 774–784. https://doi.org/10.1016/j.compedu.2012.03.017

Organization of American States. (2022). *Organization of American States Inter-American Teachers Education Network*. https://www.oas.org/en/iten/default.asp

Perraton (Ed.), H. (1993). *Distance education for teacher training.* Routledge Press.

Perry, T., Findon, M., & Cordingley, P. (2021, August). Remote and blended teacher education: A rapid review. *Education Sciences, 11*(8), 453. https://doi.org/10.3390/educsci11080453

Riel, M., & Polin, L. (2004). Common ground and critical differences in designing technical environments. In R. Barab, J. Kling, & H. Gray (Eds.), *Designing for virtual communities in the service of learning* (pp. 16-50). Cambridge University Press.

Riverin, S., & Stacey, E. (2008). Sustaining an online community of practice: A case study. *International Journal of E-Learning & Distance Education/Revue internationale du e-learning et la formation à distance, 22*(2).

South African Institute for Distance Education. (2005, November). Costing distance education and open learning in Sub-Saharan Africa: A survey of policy and practice. *Open Learning: The Journal of Open and Distance Learning, 20*(3), 211–225.

Teacher Leadership Consortium. (2011, March). *Teacher leader model standards teacher leadership exploratory consortium* . Educational Testing Service. https://www.ets.org/content/dam/ets-org/pdfs/patl/patl-teacher-leader-model-standards.pdf

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity.* Cambridge University Press.

Wenger-Trayner, E., & Wenger-Trayner, B. (2011). *Communities vs. teams*. http://wenger-trayner.com/resources/how-are-communities-of-practice-different-from-more-familiar-structures-like-teams-or-task-forces/

Zajonc, R. (1968). Attitudinal effects of mere exposure. *Journal of Personality and Social Psychology, 9*(2, Pt.2), 1–27.

Section II. Chapter 16

# SUPPORTING DISTANCE LEARNERS

## Table of Contents

**Best Practice:** Successful distance education programs provide ongoing support for learners—in their distance courses and in their places of practice.

## 16.1 Overview

One attraction of distance learning for teacher education may be that it is viewed as demanding *less* rather than *more* human interaction and support for teachers. Yet many distance learning programs ask pre-service and in-service teachers to perform two difficult tasks, either sequentially or simultaneously. They demand that teachers *learn* differently, and they demand that teachers then *teach* differently as a result of what they have learned. Both of these requirements are fraught with risk of failure, and in many distance education programs, teachers undertake both of these tasks alone, with no support.

The first issue concerns *learning*. As learners in early generations of distance learning discovered, distance learning can be a "very lonely" experience (Brown & Early, as cited by Prescott & Robinson, 1993). This isolation exacerbates all of the many issues that can occur when learners are separated from their instructor and other learners by distance. Understanding content, technical difficulties, uncertainty about how to employ a strategy, and disappointment when a new pedagogical approach fails all may be magnified when teachers confront these issues alone. As discussed in the previous three chapters, issues of support in distance courses are linked to learner completion of, satisfaction with, and performance in a distance program. This is true not just in online and blended learning, but across all modes of distance education. Studies from the 1990s, focused mainly on print and radio instruction, showed that high rates of teacher dissatisfaction with distance-based courses occur when teachers lack "support, contact and confidence" (Prescott & Robinson, 1993, p. 306).

The second issue is focused on *transfer of learning* from the distance course to a teacher's classroom. This centers on the "problem of enactment." This is a phenomenon in which teachers can learn and espouse one idea, yet continue enacting a different one, out of habit, without even noticing the contradiction (Kennedy, 1999). The problem of enactment arises from numerous factors. Teachers participating in professional development have already developed their practice and have developed habits and workarounds to address problems or balance solutions and may be confident of these workarounds and much less comfortable with newer proposed solutions. They may resist the proposed change outright. The professional development content and delivery may be too theoretical and too rote, such that teachers don't know how to implement what they've learned (Loyalka et al., 2017). Or they may lack the confidence and skills to effect a proposed change (Hord et al., 2006; Kennedy, 1999; Rogers, 1995; Sailors & Price, 2015). Whatever the motivation, the result is a failure to transfer learning from a distance course to the classroom or to do so with limited fidelity of implementation.

As seen in Chapters 2, 5, and 6, and discussed at length in Chapters 13–15, distance education programs that enjoy high rates of completion typically have been characterized by ongoing support. And, as we know from other craft-based professions, such as medicine and sports, those learning or attempting to improve their craft (like teachers), cannot simply be told to get better—they need ongoing support and help. This chapter discusses why this is so, the types of support teachers need during and after distance learning programs, and programmatic and school-based strategies to increase both course completion rates and transfer of learning from a distance course to the classroom. Above all, this chapter focuses on coaching and mentoring as mechanisms to support good teaching and to develop and retain good teachers.

## 16.2 Why Do Teachers Need Support? Understanding Change

Instruction and professional development are about *change*—changes in teachers' knowledge, skills, attitudes, beliefs, aptitudes, values, or behaviors—alone or in combination with one another. Such changes are often extraordinarily complex. Professional development asks teachers to change the way they teach. It may ask them to use modern technologies to support new modes of instruction, assessment, and classroom organization. It often asks them to teach with a new curriculum, to learn the latest content, and to do it via an unfamiliar tool (computers). While some learners can rapidly master new skills, most learners require time and support to develop new capacities. Thus, the often complex and ambitious goals of distance education programs require constant and various modes of support, both in the distance learning program itself and in schools where teachers will be implementing what they have learned.

### 16.2.1 Change Types: Diffusions of Innovation

Research on change (Rogers, 1995) states that those going through any sort of innovation approach the change process in diverse ways. This finding also holds true for teachers. As Figure 16.1 outlines, a small percentage of people are *innovators* who will eagerly embrace any innovation. *Early adopters* will also embrace an innovation, although not as quickly or as eagerly as innovators. A slightly larger group (*resistors*) will simply refuse to embrace whatever change is being promoted. Most people fall between these two positions—those who embrace an innovation and those who resist it—as either *early majority* or *late majority* types.

Such classifications are not fixed in stone. Individuals can occupy more than one distinct category, depending on the innovation. For example, a teacher may be an *early adopter* of using radio in the classroom but a *resistor* when it comes to using computers. The rate of change is also influenced by the complexity of the innovation, the pressure to implement the innovation, and the supports available to use it (Hord et al., 2006; Lotan & Burns, 2019).

As Figure 16.1 outlines, innovators, and even many early adopters, represent a tiny percentage of the overall population (2.5% and 13.5%, respectively). They are often "champion" teachers who may require limited support in their distance learning programs. Rather, support should be directed at the remaining 84% of teachers—spread among the early majority, late majority, and resistors. These may be teachers who are new to teaching, who teach out of their content area, who lack a certain set of skills, who are technically unqualified, who exhibit a more pronounced degree of resistance or reluctance toward change, who are frightened to try something new or unsure of how to do it, or who embody the problem of enactment.

Teachers in the early- and late-majority and resistor categories will require support, persuasion, practice, and opportunities for reflection to succeed in the distance course itself, as well as to implement in their classrooms what they have learned (Lotan & Burns, 2019; Sailors & Price, 2015). As will be discussed in Section 16.4, a support person, such as a coach or lead teacher, can work with varying degrees of intensity to help those who could not get through a distance course on their own or who could not—or would not—implement an innovation independently in their classrooms.

**Figure 16.1**
**Diffusions of Innovation and Change Types (Rogers, 1995)**

| Change Type | Description | Percentage of Total Group of Teachers |
|---|---|---|
| **Innovators** | These are the people who by nature always want to try new things. They like to be at the front of the process. They are always up for something new. | **Innovators** are a small percentage of any group—about 2.5%. |
| **Early adopters** | These are people who are typically opinion leaders. They have the respect of their colleagues and other teachers. These influential people are not as adventurous as innovators but will typically keep track of new things to see what might be worth trying. If they decide to try an innovation or novel approach, their opinions and actions will influence others around them. | Although not as small in number as innovators, **early adopters** are also a small percentage of any group—typically 13.5%. |
| **Early majority** | These people are a bit more conservative than the early adopters. They are "deliberate." They adopt innovative ideas just before the average member of any group does, but do not tend to keep track of things that might be new and exciting. | **The early majority** includes a sizable portion of any group—about 34%. |
| **Late majority** | These people go along with a change, not out of belief but out of necessity, or because they see the change as inevitable. They are concerned about doing a good job according to existing standards and methods, so they are slow to assume the risk of employing a novel, and perhaps untested, approach. | **The late majority** represents a sizable portion of any group—also about 34%. |
| **Resistors** | Resistors are highly reluctant to change and often never accept change, preferring the *status quo*. A program may not be able to affect such people at all or may affect only a small percentage of them, and then only in a marginal way. | **Resistors** are a small, but significant, percentage of any group—usually about 16%. |

## 16.2.2 Concerns-Based Adoption Model

In addition to these change types or personalities, research on change reveals that as teachers go through the change process—for example, as they try to adopt a new reading program or use computers for instruction—they approach the innovation with a number of concerns (Hord et al., 2006). These concerns vary in stages from how something such using a computer for teaching affects them (*self-concern*) to how they can use it (*management*) to how it fits with their teaching (*adaptation*). Figure 16.2 outlines these stages of concern.

As Figure 16.1 illustrates, teacher responses to change are highly *personal*. Figure 16.2, on the next page, demonstrates that teacher responses to change are also highly *procedural*, based on

Figure 16.2
Concerns-Based Adoption Model (Hord et al., 2006, p. 31)

| Stage of Concern | Definition: *The Teacher (Is) . . .* | Example of a Statement Expressing This Concern |
|---|---|---|
| **0. Awareness** | Aware that an innovation is being introduced but not really interested or concerned with it | "I'm not really concerned about it." |
| **1. Informational** | Interested in some information about the change | "I would like to know more about it." |
| **2. Personal** | Wants to know the personal impact of the change | "How will using it affect me?" |
| **3. Management** | Concerned about how the change will be managed in practice | "I seem to be spending all my time getting materials ready." |
| **4. Consequences** | Interested in the impact on students or the school | "How is my use affecting students?"<br>"How can I refine it to have more impact?" |
| **5. Collaboration** | Interested in collaborating with colleagues to make the change effective | "How can I do this with other teachers?" |
| **6. Refocusing** | Begins refining the innovation to improve student learning results | "I have some ideas about this that would make it work better." |

a number of professional concerns about how such changes will affect their performance. Thus, a teacher's *stage of concern* will vary according to each new innovation or each incremental change in application of the innovation. From an implementation perspective, understanding issues surrounding change types and teachers' stages of concern is important for several reasons.

**The innovation drives expectations and support.** First, the more dramatic the expected change, and the more intense the teacher concerns, the more assistance teachers will require. Their concerns about an innovation and their willingness to use it (or not use it) depend upon a number of *external* factors:

- **Complexity.** Teachers may feel more anxious about teaching with a computer, which is a complex tool, versus using interactive audio instruction (IAI)—a simpler tool—in their class.
- **Support.** Teachers' ability to implement an innovation depends upon the amount of available support.
- **Expectations.** The higher the expectations of principals or school district officials, the more support teachers will require.

The above factors suggest that innovations that are complex—for example, having teachers use a new curriculum, adopt a new instructional method, or implement new literacy strategies—increase the expectations of all involved—school leaders, teachers, ministry officials—that such complex programs will yield more favorable results. This combination of complexity and increased expectations places further stress on teachers. Therefore, the types and length of in-school assistance teachers receive must be commensurate with the complexity of and the expectations regarding an innovation.

**Professional development and support should be measured in years, not months.** Next, change can take between five and seven years to take hold, according to Hord et al. (2006). Early concerns about information, how the innovation affects the teacher personally, and management issues often take at least three years to be resolved (Hord *et al.*, 2006). Management concerns about a new curriculum, for example, can take at a least a year to resolve as teachers become familiar, try, and fail with a particular instructional method, and then reconcile how to use higher-order thinking strategies in an educational system that measures rote knowledge (Hord et al., 2006). Thus, models of professional development and support must be designed to endure over several years.

**The content and sequence of professional development and support must be driven by teachers' stages of concern.** Third, the concerns-based adoption model emphasizes the importance of meeting teachers where they are conceptually and logistically and addressing their questions *as* they are asking them. For instance, teachers cannot be pushed to *collaborate* (stage 5) when they are still focused on how to *manage* an innovation (stage 3). The types and content of professional development and support opportunities can be informed by ongoing monitoring of teachers' concerns.

**A teacher's stage of concern is directly related to his or her level of use and requires differentiated support.** Finally, a teacher's attitude toward or concern about a proposed innovation both determines and is influenced by how he or she will use the innovation—that is, by his or her level of use, as outlined in Figure 16.3 on the next page.

Knowing a teacher's stage of concern can help a support person, such as a coach, discern the motivation behind a teacher's level of use of an innovation and gauge how much and what kind of help to provide for this teacher. A teacher who uses a new science kit in a step-by-step, *mechanical* fashion (see Figure 16.3) most likely has "management" concerns (see Figure 16.2), such as figuring out how to employ an innovation without disruptions in learning, in the lesson, or by students. A teacher who is in the *refocusing* stage of concern (Figure 16.2) may need help generating more innovative uses of the science kit ("Renewal" in Figure 16.3). The link between a teacher's stages of concern and levels of use argues for highly differentiated and high-frequency support, grounded in an understanding of how concerns affect adoption.

Thus, as mentioned previously, distance education programs, especially those with a classroom focus, must address a teacher's stages of concern before the teacher can move on to the next stage. Teachers require ongoing monitoring and formative assessment, but above all they need ongoing support.

## 16.3 Strategies for Support

The fact that teachers require support, especially in terms of transferring learning, is a good thing. It means they are attempting to address the problem of enactment. Distance learning programs can essentially offer two levels of support for teachers. The first level relates to support within the distance learning program itself—policies, design elements, mechanisms, and actions that help teacher-learners to complete their distance learning course successfully. The second level concerns support in teachers' places of practice—schools—so they can successfully implement what they have learned in distance-based courses. The following two sections examine each type of support.

### 16.3.1 Programmatic Supports

The extent and types of support required by pre-service and in-service teachers are determined by a number of factors: the level of self-efficacy and self-directedness of learners; the degree and skill of the online instructor; the complexity of the learning material, design, and technology; the particular learning outcomes for teacher-learners; and the degree of structure offered by the

**Figure 16.3**
**Levels of Use of the Innovation: Behaviors (Hord et al., 2006, p. 55)**

| Levels of Use | Behavioral Indicators of Level of Use<br>*The teacher . . .* | Verbal Indicators of Level of Use<br>*What the teacher might say . . .* |
|---|---|---|
| **0. Non use** | . . . has no interest, is taking no action | "I don't know anything about it."<br>"I am doing nothing toward becoming involved." |
| **1. Orientation** | . . . is taking the initiative to learn more about the innovation | "I'd like to learn more."<br>"How do I learn about this?" |
| **2. Preparation** | . . . has definite plans to begin using the innovation | "I'm getting ready to use this for the first time."<br>"I'm thinking about how to use this." |
| **3. Mechanical** | . . . is making changes to better organize use of the innovation | "Right now, my focus is on how to use this software."<br>"I'm learning how to use this new science kit."<br>"I'm spending all my time learning how to do this." |
| **4A. Routine** | . . .is making few or no changes and has an established pattern of use | "I feel comfortable using the computer for brainstorming. However, I'm not really focused on setting up my students in groups."<br>"I can use the new questioning techniques I learned in my online course." |
| **4B. Refinement** | . . . is making changes to increase outcomes | "I'm varying the way I do reading activities in my classroom."<br>"I've made a few modifications in the interactive radio lesson." |
| **5. Integration** | . . . is making deliberate efforts to coordinate with others in using the innovation | "I'm combining the way my colleague uses *PowerPoint* slides with my own ideas for using them."<br>"I've incorporated some new grouping techniques into the way I do active learning." |
| **6. Renewal** | . . . is seeking more effective alternatives to the established use of the innovation | "I'm looking at new ways to use formative assessment in my classroom."<br>"I am planning on designing a curriculum unit that uses active learning in my geography class." |

distance-based course. As discussed in Chapter 14, in online learning, which is typically not time- or place-based, many teacher-learners often require additional support because they are being asked for the first time to assume responsibility for their own learning (Commonwealth of Learning, 2008). Some provisions for offering support, such as preparing learners to succeed in a distance environment and explicitly designing for communities of practice, are discussed in Chapters 14 and 15. Other programmatic strategies are noted in Figure 16.4.

**Figure 16.4**
**Programmatic Strategies to Support Distance Learners**

| Programmatic Strategy | Discussion |
|---|---|
| **Integrate distance-based course into the overall teacher training program (university-based or national upgrading programs)** | • Focus on quality, delivery, resources, and supports between the two modes of teacher education (distance and in-person), ensuring that the quality of outcomes of the educational experience is consistent between modes.<br>• Assign courses to be taught by the same instructors so learners receive identical qualifications whether they are located on campus or off campus.<br>• Reserve special resources and support for distance learners to ensure their engagement with the institution and ensure that everyone has access to academic counseling.<br>• Provide distance learners with access to the physical facilities (libraries, study space) and equipment necessary for their successful learning.<br>• Design opportunities for peer interaction at both the course and institutional levels to promote a sense of belonging and encourage the development of learning and social communities within and across modes of instruction (face-to-face, hybrid, online).<br>• Ensure that all learners have necessary information on financial aid, academic requirements, program structures and requirements, cost and financial support, admission criteria, assessment requirements and processes, rules and regulations, and appeals procedures (Hope, 2006, pp. 17, 18). |
| **Provide mentors and partners to first-time online learners** | • South Korea's National Open University (KNOU) employs final-year students as mentors to its incoming online learners. Mentors are responsible for helping mentees navigate the KNOU system, develop good study habits, and learn the ropes of Web-based learning. They communicate with their mentees via Web-based communications, mobile phones, and, where possible, face-to-face (Boyle et al., 2010).<br>• In Indonesia, as part of EDC's online coaching program (2008–2010), coaches who had matriculated from the same program a year earlier served as instructors and mentors for new coaching candidates (Burns, 2013). |

| Programmatic Strategy | Discussion |
|---|---|
| **Establish district and regional learning centers where teachers can access ongoing in-person support** | • The Africa Virtual University (AVU) has established 29 learning centers through partnerships with higher education institutions in 21 countries.[1] These centers offer face-to-face courses complementing AVU's distance-based upgrading program and allow teachers to use ICTs for their distance-based courses (Sawahel, 2014).<br>• China, Ireland, Canada, the United Kingdom, Georgia, Namibia, the United States, a number of Caribbean islands (e.g., Jamaica, U.S. Virgin Islands, and Puerto Rico), Zambia, Egypt, and Indonesia have all provided the equivalent of local brick-and-mortar education service centers for teachers. |
| **Establish district and regional learning centers where teachers can access ongoing in-person support *(continued)*** | • These centers can also be established by non-governmental entities. For example, Contact North (Contact Nord), mentioned in Chapter 13, runs distance learning centers in remote and rural areas of Ontario to support online learners (Contact North \| Contact Nord, n.d.).<br>• The education centers in the countries mentioned above provide a variety of services: supporting teacher coaching, providing places where teachers can take their online courses together, allowing access to technology and human supports, and offering on-demand professional development.<br>• As an example, the Zambia school program for in-service training for the team (SPRINT) is a school-based program supported by a network of district and regional centers. Teachers come here to participate in school-based professional development (typically TESSA's Open Education Resources) and for regular teacher group meetings (Open Learn Create, 2017).[2] |

[1] Support is given to teachers in French (Benin, Burkina Faso, Burundi, Cameroon, Democratic Republic of Congo, Mali, Mauritania, Niger Senegal), Portuguese (Cabo Verde, Guinea-Bissau, and Mozambique), and English (Ethiopia, Gambia, Ghana, Kenya, Nigeria, Rwanda, South Sudan, and Tanzania).

[2] SPRINT is administered by Zambia's Ministry of General Education, with the input of 600 teachers and district officials from Central Province, supported by the Open University (UK) and World Vision Zambia and funded by the Scottish Government (Open Learn Create, 2017).

| Programmatic Strategy | Discussion |
|---|---|
| **Use technology to provide teachers with informational, academic, and social supports (See Chapters 6, 14, and 15)** | • Chatbots, artificial intelligence tools, FAQs, interactive voice response software, toll-free numbers, help desks (e.g., *Zendesk*), email, automated response systems, and websites all can help learners get immediate supports and answers to questions, thereby facilitating effective resolution at the first point of contact.<br>• Communications tools such as *VoiceThread*, *Zoom*, and *Teams* allow teachers to have real-time discussions about a learning artifact or engage in face-based virtual interaction. The use of social media as part of a structured learning experience can help teachers interact more frequently, build more diverse personal learning networks, and diminish the isolation and alienation online learners often feel—while enhancing the quantity, quality, support, and reciprocity of personal learning networks (Burns & Bodrogini, 2011).<br>• Online tutoring supports include individual or small-group instructor tutoring, peer tutoring, or tutoring programs, such as computer-aided instruction and intelligent tutoring systems. Teachers can retrieve and review information from screencasts and recorded webinars (webcasts).<br>• Phones (voice and text), e-mail, *WhatsApp*, videoconferencing, and Web-based communication tools all facilitate synchronous communication between instructors and learners. Such communication can provide some of the verbal immediacy and just-in-time assistance so critical to participants' satisfaction with distance-based learning, and it can mitigate the anonymity and impersonal context of an online environment (Dikkers, 2018; Liu et al., 2022). |
| **Partner with agencies to provide face-to-face support and interaction with teachers** | • Contract with people and institutions who can help manage and support teachers. For example, in Estonia, local government councils provide technology support to schools (Burns, in press).<br>• Explore commercial coaching providers. Numerous school districts in the United States and schools in Estonia partner with commercial coaching providers, such as *IRIS Connect*, to provide teachers with ongoing support (N. Edisherashvili, personal communication, March 20, 2022). Other commercial products include *Edthena* and *MyTeachingPartner*.<br>• Deploy local district education office staff to provide support. Guinea's Fundamental Quality in Education Level IRI program (1998–2006) developed monthly *cercles de renseignement* (teaching circles), with teachers who were part of an IAI initiative. Local circuit inspectors were given print-based manuals and audiotapes in order to provide face-to-face support to help teachers implement IAI-based instruction (Burns, 2010).<br>• Kenya's TUSOME national tablet program provides district curriculum support officers with digital tablets to improve classroom observation, support, and accountability (Piper et al., 2018). |

| Programmatic Strategy | Discussion |
|---|---|
| **Partner with agencies to provide face-to-face support and interaction with teachers** *(continued)* | • Where available, build or leverage relationships with more well-resourced schools. Reach out to university lab schools, international schools, or professional development schools to provide support, model practices, and invite distance learners to observe classrooms. |
| **Design distance education interventions that are highly structured and offer just-in-time supports** | • Consider highly structured in-class types of training or professional development, such as IAI, instructional television, scripted lesson guides, two-way audio, or virtual classes.<br>• Offer differentiated professional development so teachers engage in professional learning activities that are highly supportive (e.g., study groups or lesson study) and balanced with print-based courses or asynchronous online courses.<br>• Design synchronous elements into distance courses such as Web meetings, live classes, phone conferencing, or chat sessions that approximate a sense of immediate connection or presence (Burns, 2010).<br>• Create micro-courses to reduce the risk of attrition in longer courses. |
| **Build supportive structures into the course or program design** | • Cap the number of learners in a course to a manageable size (e.g., 20).<br>• Mandate brief weekly chat sessions between the instructor and learners.<br>• Require that instructors respond to learner e-mails within 24 hours.<br>• Offer as-needed instructor tutoring sessions.<br>• Schedule one or more face-to-face meetings between the instructor and learners in a term.<br>• Hold weekly online "office hours" during which individual learners can pose questions and share concerns with the instructor.<br>• Schedule regular phone calls and/or site visits by the instructor to teachers' schools.<br>• Pair learners with a "buddy" or learning team so no one is alone. This pairing can be done by grade level, content area, perceived personality compatibility, or geographic location (Boyle et al., 2010; Burns, 2013). |
| **Build extensive peer support into distance courses (See Chapters 14 and 15)** | • Establish teacher learning circles<br>• Organize learners into communities of practice<br>• Engage learners in collaborative projects and peer assessment<br>• Give learners roles and responsibilities in the course so they are incentivized to reach out to colleagues<br>• Design icebreakers, fun days, games or create a "Committee for Fun" to build relationships |

While necessary, the supports above can tax the distance education system and can greatly increase staff workload. However, these supports may pay for themselves in terms of reducing attrition and promoting greater learning transfer. Institutions must either employ additional staff and increase costs or find other ways of limiting the demands on distance instructors' time so that they can conduct these important support functions.

## 16.3.2 School-Based Supports

Support for teacher-learners should not end upon the conclusion of a distance learning program or course. In fact, it is often upon the conclusion of a course or workshop that teachers' real questions, and real need for support, begin in earnest. Figure 16.5 outlines some school-based support strategies that distance-based education programs can deploy to ensure an instructional return on investment.

**Figure 16.5**
**School-Based Strategies to Support Distance Learners**

| Strategy for School-Based Support | Example |
|---|---|
| **Secure principal involvement** | Principals play a key role in educational quality, in particular where they function as instructional leaders (Bartanen et al., 2022; Grissom et al., 2021; Huber & West, 2002). As part of distance educational programming, principals can do the following:<br>• Advocate for professional development programs so that the program's objectives and priorities become those of the principal. (This may require equipping the principal with additional skills to conduct, support, monitor, and evaluate such changes so he or she can support teachers in the change process.)<br>• Secure adequate resources and materials to enable teachers to do their jobs better, particularly if principals feel a sense of ownership and accountability with regard to the initiative.<br>• Set the tone and establish an instructional culture in which learning is at the core.<br>• Direct more support toward teachers, such as pairing novice teachers with trained, experienced mentors or coaches; providing teachers with the time and impetus to promote positive collegial interaction and support; and giving teachers the time to meet, discuss, and plan. |
| **Focus on professional development as school improvement** | • Connect professional development to overall school improvement and continuous improvement.<br>• With principal leadership and a critical mass of teachers (see below), professional development can harness a "collective moral purpose," where everyone is working toward the same goal of improvement and where an innovative instructional climate can take hold and the collective efficacy of the school can be increased (Fullan, 2005, p. 68; see also, Donohoo, 2017). |

| Strategy for School-Based Support | Example |
|---|---|
| **Focus on professional development as school improvement** *(continued)* | • For example, school-based lesson study has been used in England to focus on school improvement, helping teachers address hard-to-teach and hard-to-learn topics. This provides teachers with a mechanism to focus on continual self-improvement and school betterment, and results in consistency and depth in the teaching of content topics (Dudley, 2019). |
| **Involve a critical mass of teachers in the distance-based, blended, or online professional development** | • Target a critical mass of teachers at each school—enough so that the intervention becomes self-sustaining, carried forward by its own momentum and teachers' sense of ownership, belief, and success in implementing, versus being driven by external mandates or by a few teacher champions.<br>• Involving a critical mass of teachers can cultivate a school-based community of learners and practitioners where teachers work together to customize, personalize, and adapt new skills and concepts to their particular setting (See Chapter 15).<br>• Studies from Japan, England, China, Zambia, and Kenya suggest that involving all teachers in intensive professional development such as lesson study, can promote dedicated support networks and communities of inquiry at the school level (Doig & Groves, 2011; Dudley, 2019; Jung et al., 2016). |
| **Provide teachers with covered time during the school day to meet and support one another** | Covered time is paid time during the school day and can involve:<br>• Common planning time<br>• Horizontal and vertical teaming<br>• Department meetings<br>• Grade-level meetings<br>• After-school professional development |
| **Offer school-based in-person support as part of the distance learning program** | • No matter the focus of the distance learning program, teachers will require instructional support to transfer learning from coursework to their classrooms.<br>• Coaching has been shown to have larger effect sizes than coursework in improving the structural characteristics in classrooms (Neuman & Wright, 2010, pp. 63, 83; Fixsen et al., 2005).<br>• Well-trained support staff can offer ongoing, in-class, practical, differentiated, and personalized instruction and support (Neuman & Wright, 2010, p. 83).<br>• Teachers, especially new ones, who receive coaching and mentoring (discussed below) are less likely to leave teaching and more likely to improve practice (Bastian & Marks, 2017; Darling-Hammond & Bransford, 2005; Ingersoll & Strong, 2011; Organisation for Economic Co-operation and Development, 2009). |

## 16.4 Coaching and Mentoring

The most important supports for teachers come in the form of personal assistance: a technical support person who can help a teacher log in to her online course; a principal who provides teachers with time to plan a project for their distance courses or who actively encourages the teacher to try a learner-centered activity (and ignores the chaos and noise that may ensue the first time the teacher undertakes such a task); a community of colleagues who offer moral support, since they are all undergoing the same intervention together; or an instructional support person who can help the teacher translate, practice, and refine in her classroom a new teaching strategy that she learned via audio broadcast. Typically, this is a coach or a mentor.

Teacher coaching has emerged as a promising alternative to traditional models of professional development, and its frequency has increased across the globe—both in wealthy countries and in bilateral and multilateral donor-funded education projects in lower-income ones (Kraft et al., 2018). As an example of the former, in the 2015-2016 academic year, 66% of U.S. public schools reported having "staff with specialist or coaching assignments" (National Center for Educational Statistics, 2017). A 2020 U.S. national survey suggests that the percentage may actually be much higher—83% of respondents reported some kind of coaching in their school or district (Van Nostrand et al., 2022).

*Coaching* is a method of directing, instructing, and supporting a person or group of people to achieve a particular goal or to develop a set of specific skills. At its core, coaching is a *technical* relationship—highly personalized, differentiated, individualized professional development. It involves a number of tasks, but a coach's main job is to empower the teacher in terms of a particular set of skills and knowledge. This empowerment involves sharing expertise and evidence-based practices and is focused directly on teachers' individual needs (Kraft et al., 2018; van Nieuwerburgh, 2017).

A *coach* is a trained and knowledgeable professional who is skilled at taking teachers (or principals) from where they are to where they want to be. In education, as in sports, a coach's job is to make people work better in their profession and to be better professionals. A coach does this by helping teachers (1) meet a goal or do something well (this is the narrowest definition), (2) develop the skills and dispositions to attain their goals independently, and (3) develop the skills and dispositions to work together effectively with other teachers to attain goals (Garmston & Wellman, 2013).

Within education, coaches have a number of roles—including classroom supporters, resource providers, facilitators, catalysts for change, or instructional coaches. Unlike a mentor (discussed below), a coach may be a peer or have equal or less experience than the person he or she is coaching. A coach is not a supervisor, an evaluator, an inspector, the teacher's boss, a teacher's helper, or an assistant (Killion & Harrison, 2008).

*Coaching* is extremely diverse, and there are many types of coaches. *Data* coaches help teachers use data to inform instruction. *Instructional* coaches assist teachers with content-focused pedagogical approaches. *Content* coaches focus on improving the teaching of subject matter. *Technology* coaches support teachers in integrating Information and Communication Technologies (ICTs) into teaching and learning. *Literacy* coaches help teachers implement evidence-based reading and writing strategies. *Turnaround* coaches work in schools often targeted as failing or in need of corrective action and provide teachers and the principal with an array of supports.

There are also numerous coaching *approaches*: Technical coaching, directive coaching, facilitative coaching, informational coaching, catalytic coaching, and cognitive coaching represent just a few of these. And there are numerous coaching *frameworks*: a gradual release of responsibility approach (explained in Figure 16.6); leveled coaching; the GROW model (Goals, Reality, Options, Wrap Up); solutions-focused coaching; transformational coaching; and instructional rounds (Burns & Lawrie, 2015; City et al., 2009).

The research on coaching points to its numerous benefits, including:

- Improved teacher retention in professional development or distance courses (Burns, 2013; Ho & Burns, 2010).
- Greater coherence with school reform and professional development efforts (Bastian & Marks, 2017; Desimone & Stuckey, 2014; Killion & Harrison, 2008).
- Successful transfer of learning, thus addressing the problem of enactment (Bakhshaei et al., 2019; Burns, 2013; Darling-Hammond et al., 2017a; Fixsen et al., 2005; Ho & Burns, 2010; Timperley et al., 2007).
- Large effects on teacher practice (upwards of 0.5 standard deviations [SD]) and increased instructional quality (Bakhshaei et al., 2019; Hill et al., 2022; Kotze et al., 2019; Kraft et al., 2018; Neuman & Wright, 2010; Sailors & Price, 2015). Hill (2020) reported that teachers who received individual coaching saw classroom practice improve by 20 percentile points, as measured by classroom observation instruments. A meta-analysis by Kraft et al. (2018) found that as a result of coaching, the quality of teachers' instruction improved by 0. 49 SDs—"more than the difference in effectiveness between a novice and a teacher with five to 10 years of experience, a more positive estimated effect than traditional PD and most other school-based interventions" (Kraft et al., 2018, p. 27).
- Gains in learning outcomes on test scores for students whose teachers receive coaching (Kotze et al., 2019; Kraft & Blazar, 2018; Kraft et al., 2018; Sailors & Price, 2015). These difference have been documented across several studies in the United States and South Africa—from 0.18 SDs (Kraft et al., 2018), a 0.41 SD increase in student test scores (Kotze et al., 2019) and an increase of 6-7 percentile points compared with students in classrooms where teachers were not coached (Hill, 2020). In examining all education interventions, only one-on-one, high-dosage tutoring with students had

**Figure 16.6**
**Gradual Release of Responsibility Coaching in Indonesia**

As part of USAID's Decentralizing Basic Education 2 (DBE2) program in Indonesia, the Education Development Center developed in 2008–2010 a coaching model to help teachers in rural schools implement learner-centered instructional practices as part of a one-computer classroom project.

Three hundred teachers received weekly coaching from a pair of coaches (60 in all) who came to the school two to three times per week. The coaches themselves were former teachers, master teacher trainers, or subject-area specialists who participated in a five-month online program where each week they learned a particular coaching technique online and then implemented it in-person with their coaching partner as they worked with a group of teachers in schools.

The coaching program employed a gradual release of responsibility approach in which coaches (1) modeled a learner-centered activity for teachers; (2) guided teachers in adapting or designing this model for their classrooms; (3) formally co-taught the lesson with teachers using one of Cook & Friend's (1995) six co-teaching models; (4) prepared each teacher to teach the lesson alone; and (5) provided observation and feedback on the teacher's "solo teaching" episode. Each of these cycles repeated three to four times throughout the semester.

In contrast to the implementation rates of DBE2's regular cascade approach, which hovered somewhere around 5%, 98% of coached teachers implemented at least one computer learner-centered activity in their classroom (Burns, 2013; Burns & Lawrie, 2015, pp. 90–91).

larger effects on academic outcomes than coaching teachers (Fryer, 2017, as cited in Blazar et al., 2022).

- Positive associations with teacher value-added models[3] in subjects such as mathematics and in improved teacher retention (Bastian & Marks, 2017).

As a whole, teachers who receive on-the-job support, guidance, and feedback from an external support person or their peers practice new skills and strategies more frequently, apply them more appropriately, and adopt a more diverse range of instructional practices than do teachers who do not receive such supports (Burns & Lawrie, 2015; Joyce & Showers, 2002). However, the above results are not possible without well-designed coaching programs that instantiate the "critical features" of high-quality professional development—job-embedded practice, intense and sustained duration, a focus on discrete skill sets, and active learning (Desimone & Stuckey, 2014).

### 16.4.1 Supporting New Teachers

The supports mentioned throughout this guide are important for all teachers, but they are most crucial for novice teachers entering the classroom for the first time. Although many nations do not keep track of such data and current exact data are hard to come by, there is sufficient evidence to suggest that teacher turnover—or attrition—is a serious global problem that has exacerbated what is already a severe global teacher shortage (Teacher Task Force, 2021).

#### Teacher attrition: From teaching

The previous three chapters discussed teacher attrition from distance education programs. Far more concerning is teacher attrition from teaching itself.

Teacher attrition has long preoccupied policymakers because of its threats to overall educational quality, especially for learners who are in the greatest need of quality teaching—those in refugee contexts; rural schools; urban schools in wealthy countries that often serve children of color who are poor or migrants; and learners in the poorest parts of the globe, that is, Sub-Saharan Africa and Southwest Asia (Akiba et al., 2007; National Commission on Teaching and America's Future, 2003; Quartz et al., 2008; Ring & West, 2015; Sinyolo, 2007; Teacher Task Force, 2021; United Nations Educational, Scientific and Cultural Organization, 2022).

In Sub-Saharan Africa, 16.5 million additional teachers are needed to achieve the United Nations' Sustainable Development Goal 4—5.4 million at the primary level and 11.1 million at the secondary level (United Nations Educational, Scientific and Cultural Organization, 2022, p. 4). Although nowhere near as dramatic, teacher shortages are prevalent in wealthy countries, too. The Netherlands, France, and Japan all reported shortages of primary school teachers—9,100, 4,000, and 2,558, respectively—in 2022. Sweden predicts that it will need 153,000 new teachers by 2035 (United Nations Educational, Scientific and Cultural Organization, 2022, p. 4, 6).

Attrition from teaching and teacher migration between schools carry serious financial, organizational, academic, and economic implications for wealthy education systems—the United States, New Zealand, Canada, and the United Kingdom—as well as for poor and middle-income ones such as the Gambia, Lesotho, and Tanzania (Sinyolo, 2007; Spooner-Lane, 2017). Recruiting, hiring, and training teachers is a time-consuming and expensive process that requires schools and districts to shift financial and human resources away from other programs in order to find new teachers (National Commission on Teaching and America's Future, 2003; New Teacher Center 2019; Quartz et al., 2008). While

[3] Teacher Value Added Models (VAM) attempt to measure a teacher's effect on his/her students' achievement through a variety of measures that examine a student's actual and predicted test scores. VAM is used in a number of U.S. school districts but is not without critics and controversy. For more information, see: https://www.nassp.org/top-issues-in-education/position-statements/value-added-measures-in-teacher-evaluation/

costs vary dramatically across and within countries because of salaries, budgets, funding streams, and certification and professional development requirements, the most recent literature on teacher turnover costs in the United States found that hiring one new replacement teacher costs $17,872 (New Teacher Center 2019). A 2007 study of teacher turnover in Texas noted that the state's annual turnover rate, including a 40% turnover rate for teachers in their first three years of teaching, cost a "conservative estimate" of $470 million per year (updated to reflect 2022 costs) (Wynn et al., 2007, p. 210).

Attrition may be formally noted or not, and it assumes numerous forms. Much attrition is due to retirement (primarily), resignations, death (especially from AIDS and COVID-19), and dismissals (Sinyolo, 2007). And much is due to other factors: Teachers may simply fail to show up for work or do so irregularly (Sinyolo, 2007). They may exit government schools for the improved pay and, often, higher perceived quality and status of private schools or schools with "high achieving, high income" students (Hanushek et al., 2004, p. 338; Johnson & Birkeland, 2003; Quartz et al., 2008; Ring & West, 2015; Teacher Task Force, 2021). Poor salaries; low social recognition of their work; lack of opportunities for professional development; insufficient promotion prospects; difficult working conditions; and, in the United States, attacks by parents over wearing masks during the 2020 pandemic, the perceived politicization of education, and fears of school shootings have all led teachers to resign from teaching (Barlow, 2021; Modan, 2022; Quartz et al., 2008; Ring & West, 2015; Teacher Task Force, 2021; UNESCO, 2022).

Teacher attrition does not affect all countries, subjects areas, or populations equally. Ireland, Finland, and the Seychelles have a teacher surplus, while primary-level teacher attrition in Guinea, Sierra Leone, Mauritania, and Benin is 22%, 17%, 16%, and 13% respectively over five years (Teacher Task Force, 2021). Globally, STEM teachers are in shorter supply than language arts teachers; so too are substitute or supply teachers in the U.S., Canada and Wales (Cray, 2022; Belger, 2023). Sub-Saharan Africa has an acute shortage of secondary versus primary teachers (UNESCO, 2022[4]). In the United States, where teacher attrition is often hard to enumerate, attrition of new teachers by year five has been estimated to range between 30% and 50% (Gray & Taie, 2015; Ingersoll & Strong, 2011; Smith & Ingersoll, 2004). At the start of the 2022 school year, 44% of U.S. public schools reported at least one teaching vacancy, with more than half due to resignations (National Center for Education Statistics, 2022).

Factors such as gender and youth can exacerbate attrition. In many contexts, women are more likely than men to leave the profession, and in the United States and Pacific Rim countries, younger teachers have been reported as more likely to leave teaching (Moskowitz & Stephens, 1997; Quartz et al., 2008; Ring & West, 2015). In many cases, teachers will leave low-performing or poor schools for those that make good teaching possible (Johnson & Birkeland, 2003).

Within the United States, an authoritative report by the National Commission on Teaching and America's Future (NCTAF), although two decades old, estimated that 50% of new teachers leave teaching within their first five years, and one of the major drivers cited for this attrition is "isolation" (NCTAF, 2003; Fulton et al., 2005; Smith & Ingersoll, 2004). Unlike their more experienced colleagues, new teachers do not have an established professional network. They cannot draw on a reservoir of experience and accumulated knowledge to guide them when times get tough. They often lack the confidence of their more experienced colleagues. In cultures that value

[4] UNESCO (2022) reports that the secondary teacher workforce needs to grow more than 15 per cent annually in the Central African Republic, Chad, Ethiopia, Malawi, Niger, and the United Republic of Tanzania.

age, hierarchy, and problem avoidance, they may not have the respect of their older administrators, nor feel comfortable asking for help. Although the report is dated, those feelings have been corroborated by more current research on novice teachers—and all speak to the importance of mentoring and induction (Bastian & Marks, 2017; Podolsky et al., 2019).

### Mentoring new teachers

The first few years of a teacher's career are formative ones as teachers make the leap from preparation to practice. Depending on the amount and quality of support they encounter in their first teaching job, new teachers can grow into highly competent ones—or they may develop counterproductive approaches or leave the profession entirely (Podolsky et al., 2019, p. 16). Moir (1990) classifies a first-year teacher's trajectory as anticipation, survival, disillusionment, rejuvenation, reflection, and anticipation again. Without effective mentoring support, many beginning teachers may struggle early in their careers, get stuck at one of the phases described above (e.g., disillusionment) and fail to learn the nuances of effective teaching (Moir, 1990; Spooner-Lane, 2017). In contrast, new teachers who receive immediate support and guidance are much more likely to become, and remain, effective teachers over time (Podolsky et al., 2019, p. 16).

Mentoring has been shown to have a positive effect on teacher commitment and retention, teacher classroom instructional practices, and student achievement (Ingersoll & Strong, 2011). Mentoring refers to one-on-one assistance and support to a novice from an experienced professional. Typically, mentors are established and seasoned teachers charged with the task of helping to train, advise, and share practical experience with a novice teacher. They share their body of experience, impart knowledge, offer wisdom, and generally help novices (referred to as *protégés* or *mentees*) learn the ropes.

Mentoring can be formal or informal; stand-alone, as a purely school-based and directed initiative; or it can be a component of a broader formal induction program (as discussed below) (Boeskens et al., 2020; Reid & Kleinhenz, 2015).

Coaching and mentoring share numerous characteristics but are often erroneously conflated. Figure 16.7 clarifies some of the similarities and differences between the two.

As with coaching, mentoring has grown in popularity across global education systems. It is a feature in over 90% of schools in Organisation for Economic Co-operation and Development (OECD) countries such as Australia, Belgium, the Slovak Republic, Japan, Israel, New Zealand, Ireland, the United Kingdom, the United States, and Singapore, as well as Shanghai and Taiwan (Buchanan, 2019; European Commission/EACEA/Eurydice, 2019; Hsieh et al., 2013).

Over the years, numerous studies have emphasized the critical role of mentoring in preparing highly qualified teachers (Bastian & Marks, 2017; Buchanan, 2019; Darling-Hammond et al., 2017a; Ellis et al., 2020; Howe, 2006; Hsieh et al., 2013; Reid & Kleinhenz, 2015; Spooner-Lane, 2017; Ingersoll & Strong, 2011). These benefits include the following:

- **Successful transition of novice teachers from university graduation to classroom teaching.** This is particularly important in contexts where practicing teachers have little or no formal teacher training (Darling-Hammond et al., 2017a; Howe, 2006; European Commission/EACEA/Eurydice, 2019).
- **Greater job satisfaction.** Teachers in OECD[5] countries who have participated in mentoring programs report higher job satisfaction (Organisation for Economic Co-operation and Development, 2020).

[5] The OECD is an intergovernmental organization with 38 member countries

**Figure 16.7**
**Similarities and Differences Between Coaches and Mentors (Based on Killion & Harrison, 2008)**

| Characteristics | Coach | Mentor |
|---|---|---|
| **Relationship with teachers** | Technical | Developmental |
| **Teacher population with which they work** | Teachers at all stages of their career | New teachers |
| **Focus** | Implementation, transfer of learning, improvement of practice | Becoming acculturated to teaching and to the school; successfully transitioning from learning about teaching to learning to teach |
| **Techniques used with teachers** | Modeling, inquiry, and reflection | Modeling, inquiry, and reflection |
| **Experience level vis-à-vis teacher being coached or mentored** | May be less experienced than teacher they coach or may be a teacher peer | Always more experienced than the teacher they mentor |

- **Reduced teacher attrition.** Research points to significantly reduced attrition rates among novice teachers who have received school-based mentorship because of this increase in support and reduction of isolation (European Commission/EACEA/Eurydice, 2019; Bastian & Marks, 2017; Darling-Hammond et al., 2009; Hallam et al., 2012; Ingersoll & Strong, 2011; New Teacher Center, 2019; Smith & Ingersoll, 2004). A study of the U.S. state of North Carolina's New Teacher Support Program (NTSP) found that NTSP teachers (i.e., who were mentored) were significantly more likely to return to their lowest-performing schools than were teachers who did not participate in the program. These retention results are particularly important since attrition is a more acute issue in low- versus high-performing schools (Bastian & Marks, 2017).
- **Improved learning transfer.** Teachers who participate in online learning combined with in-class mentoring show greater improvements in teaching than do teachers who participate only in online learning (Landry et al., 2009).
- **Improved student achievement.** Across OECD countries, students in schools where teacher mentoring is provided perform better on average in reading than do students enrolled in schools where no mentoring is provided (Caven et al., 2021; OECD, 2020; Spooner-Lane, 2017).[6]
- **Additional benefits.** Mentoring at an early career stage has a positive impact on mentees' teaching practice, career development, and commitment to teaching, as well as on the skills of mentor teachers who have been shown to gain a number of new skills and reinforce certain competencies as a result of the mentoring process (Darling-Hammond et al., 2017a; Podolsky et al., 2019).

[6] This finding should be interpreted carefully given the generally high socioeconomic status of OECD countries (N. Edisherashvili, personal communication, March 20, 2022).

## Teacher induction

New or novice teachers—those graduating from teacher training programs and beginning their first year of teaching—often require a suite of supports that differ from those required by more experienced colleagues.

Teacher "induction" is a systemwide, coherent comprehensive training and support process that acculturates new teachers into the teaching profession. It often includes formal orientation sessions, common planning time and collaboration, ongoing professional development, access to experts, reduced teaching load, and/or participation in an external network of teachers. Mentoring is often an essential part of a new teacher induction program (Wong, 2004; Breaux & Wong, 2003). (See Figure 16.8 for examples).

Induction may endure for the first two-to-three years of a new teacher's career and forms part of a career-long professional development program.

Induction programs may be formal or informal and either low-intensity or high-intensity. *Low-intensity programs* include orientation activities, opportunities for collaboration, matching new teachers with veterans, and adjusting working conditions. While low-intensity induction programs are helpful for teacher retention, they do little to develop teacher effectiveness. *High-intensity programs* include mini-courses for new teachers, networking opportunities, mentoring, release time, reduced teaching load, university credit for professional development, observation and assessment by an expert peer, and opportunities to observe an expert peer (Ingersoll & Strong, 2011).

Reviews of induction programs in Australia, Britain, Canada, France, Germany, Japan, New Zealand, Singapore, Shanghai, and the United States suggest that the most effective induction approaches are based on the following elements:

- Opportunities for mentors and mentees to learn together in a supportive environment promoting time for collaboration, reflection, and acculturation into the profession of teaching;
- Individualized induction plans for novice teachers;
- Mentor training;
- Development of partner schools for more extended periods of induction—mixed between universities and schools in the teacher's first year, followed by more intensive, school-based elements in the second year;
- Reduction in responsibilities, in addition to reduction in teaching workload and increased time for reflection and self-assessment;
- Development of an organizational culture in which there is collaborative exchange involving a range of professionals aimed at supporting newly qualified teachers; and,
- Separation of the support and assessment functions of induction (Darling-Hammond et al., 2017a; Howe, 2006; Ingersoll & Strong, 2011).

Induction programs vary along numerous dimensions. They can be *mandatory or voluntary*. For example, induction is mandatory for new teachers in England as well as in 25 European Union (EU) countries, including Ireland, France, Germany, Spain, Portugal, and Poland. In Iceland, Norway, Estonia, Finland, Slovenia and some cantons of Switzerland, induction is recommended but not compulsory (European Commission/EACEA/Eurydice, 2019).

Induction programs also vary in their *duration*. They range from 4 months in Greece to 12 months in the United Kingdom, France, and Italy, to 2 years in Malta and 3 years in Liechtenstein. In Spain, the content and duration of the induction phase vary depending on the Autonomous Community concerned, e.g., Basque or Catalan (European Commission/EACEA/Eurydice, 2019).

They also vary by *type*. For example, Ireland offers two models of induction: In the National Induction Program Workshops, newly qualified teachers must complete 20 hours of workshops. Or they

**Figure 16.8**
**Induction Programs in Shanghai and Ontario**

**Shanghai, China:** All first-year basic education teachers in Shanghai are required to obtain classroom experience through a one-year in-service induction program to facilitate transition to the teaching job and before hiring is finalized. New teachers must spend 50% of their time teaching in the classroom and the other 50% receiving professional development at district teacher training centers. This induction period is also a probationary period, during which each new teacher is assigned a mentor who is selected based on experience and reputation as a highly skilled teacher. This mentor works closely with the new teacher, guiding him or her through processes such as lesson planning, selecting teaching materials, making decisions about student assignments, and giving feedback to students. Mentors and mentees work together for a minimum of two hours per week. Mentors also observe new teachers, and new teachers are expected to observe their mentors in order to see models of highly skilled instruction ("open classrooms"). Mentors keep records of their activities and document the development of mentees for review by the school principal (Darling-Hammond et al., 2017b).

During this probationary period and after becoming part of the regular teaching force, these new teachers become part of the school teaching-research group, which gathers teachers together by subject area. These groups frequently engage in various professional and instructional activities such as mentoring, peer coaching, demonstration lessons, preparing lesson plans jointly, and studying new curriculum standards and pedagogy. The structure and activities become integral to a teacher's teaching and work life in school (The World Bank Group, 2016).

**Ontario, Canada.** All first-year permanent teachers and those who hold long-term occasional contracts participate in the New Teacher Induction Program (NTIP). Funded by the Ontario Ministry of Education, NTIP includes an orientation to the school and school board, ongoing mentoring by more experienced teachers throughout the first year, and professional development and training appropriate to the needs of new teachers. Boards of education may decide to extend NTIP supports to the second year for either permanent hires or LTO teachers.

Mentors are selected for their teaching and mentoring skills and are trained as mentors within their district. The NTIP provides shared release time for mentors and new teachers to collaborate. This time can be used for co-planning, classroom observation, collaborative assessment of student work, and deciding on specific supports. Schools may choose from different mentoring models such as one-to-one mentoring and large- or small-group mentoring. A major emphasis is on helping novices manage professional relationships and learn how to seek out the resources they need for ongoing growth and development (Darling-Hammond et al. 2017b, p. 11).

Results have been noteworthy. Ontario's new teacher retention rate/license renewal rate is over 95%. Of the nearly 4,000 new teachers hired between 2005 and 2010, the Toronto school district retained 98–99% of these first-year hires annually (Ontario College of Teachers, 2014).

can participate in the school-based system *Droichead* (Bridge), which combines induction and probation/post-qualification work experience. Primary teachers require at least 100 teaching hours to complete *Droichead*, and post-primary teachers must have 300 teaching hours. Newly qualified teachers have 36 months to complete either model (European Commission/EACEA/Eurydice, 2019).

In Scotland, compulsory induction can also be undertaken in one of two ways. The Teacher Induction Scheme provides a guaranteed one-year training post in a local authority school to every eligible learner graduating with a teaching qualification from one of Scotland's universities. "Flexible Route" induction is for new teachers who cannot commit to a full-time post, who want to complete their probationary period somewhere other than a Scottish state school, or who are registered in more than one subject and are looking to gain full registration in their second subject (Educational Institute of Scotland, 2021).

Finally, induction programs vary by the *activities* mandated, emphasized, or offered. Most EU countries that have induction programs mandate mentoring. Mentor classroom observations are required in Germany, Greece, France, and Italy, while they are optional in Hungary, Malta, and Poland. In Poland and Scotland, mentor-mentee team teaching is mandated as part of induction, while it is optional in Germany, France, and Italy, and is not required at all in most other EU countries (European Commission/EACEA/Eurydice, 2019, p. 54). In Singapore's two-year formal induction program, the *Beginning Teachers' Induction Program* (BTIP), induction activities focus on topics such as classroom management, parent engagement, teacher-student relationships, reflective practice, and assessment literacy (Darling-Hammond et al., 2017a).

Like mentoring as a stand-alone support, mentoring as part of new teacher induction programs has demonstrated considerable success in past decades. Some of the more noteworthy benefits include:

- Facilitating the transition from pre-service to in-service teaching (Darling-Hammond et al., 2017a; Organisation for Economic Co-operation and Development, 2020)
- Improving the quality of new teachers and addressing attrition issues (Bastian & Marks, 2017; New Teacher Center, 2019)
- Attracting better teacher-candidates, reducing attrition, increasing job satisfaction, enhancing professional development, and improving teaching and learning (Bastian & Marks, 2017; New Teacher Center, 2019)

### 16.4.2 Virtual Coaching and Mentoring[7]

Technology can—and does—serve as a critical tool for providing teachers with support, particularly in contexts that lack in-house, qualified coaches; where coaches cannot travel because of issues of distance, geography, conflict, and pandemic outbreaks; and in many environments where in-person coaching is neither affordable nor feasible (Burns, 2021a; Burns, 2021b; Hennessy et al., 2022; Kraft & Blazar, 2018; Mendenhall et al., 2017).

Because coaching and mentoring are so individualized and differentiated, so too are the various technologies that can be used to support and extend their reach. (Examples of mobile-based technology-based coaching have been discussed in Chapter 6 and will not be reexamined here). For example, Google *Docs* allows coaches to comment on teacher lesson plans; IAI can provide highly scaffolded, classroom-based teaching support to teachers. *Discord*'s free voice, video, and text chat apps support interactive large and small group activities. Tools such as *ClickUp* can help

[7] This section on technology-based coaching draws heavily from M. Burns (2021a), Can virtual coaching be an effective substitute for in-person coaching? Used with written permission from Global Partnership for Education.

with to-do lists and task management. *Screencast-O-Matic* and *ScribeHow* help coaches create easy how-to guides and demonstration videos for teachers.[8] Figure 16.9 outlines certain technology tools and how they can be used to support teachers as part of coaching or mentoring programs.

**Figure 16.9**
**Technology Tools for Teacher Coaching and Mentoring (Burns, 2021a)**

| Type of Technology | Tasks Supporting Coaching and Mentoring – Examples |
|---|---|
| **SMS/text messages** | • Basic skills (literacy and numeracy) instruction<br>• Check-ins, staying in touch<br>• Data collection<br>• Emotional support ("check ins")<br>• FAQs and Q&As<br>• Information and learning resources<br>• Nudges and reminders<br>• Sharing resources<br>• Support groups |
| **Two-way video (video conferencing)** | • Classroom observations<br>• Communities of practice<br>• Co-teaching<br>• Demonstrations<br>• Feedback<br>• Group-based coaching<br>• Lesson study<br>• Live coaching<br>• Open lessons<br>• Pre- and post-conference observations |
| **Multimedia (games, simulations, VR and AR)** | • Helping teachers "think like professionals" (scientist, mathematician, or other)<br>• Multichannel insights into complex problems<br>• Refining content knowledge<br>• Reinforcement<br>• Role-playing<br>• Semi-immersive experiences<br>• Scenarios and problem-solving exercises<br>• Simulations |
| **Recorded video** | • Learning skills and procedural knowledge<br>• Modeling best practices<br>• Peer feedback self-reflection on teaching, particularly when using protocols<br>• Training content: Prerecorded video for review, reference, demonstration<br>• Virtual learning walks |

[8] More technology tools for coaching and mentoring can be found at https://www.mglead.org/csw-main/csw-digital-tools

| Type of Technology | Tasks Supporting Coaching and Mentoring – Examples |
|---|---|
| **Apps and extensions** | Examples of apps for various tasks, including productivity tasks:<br>• *Evernote*<br>• *InsertLearning*<br>• *Kaizena*<br>• *Kami*<br>• *Mote*<br>• *Notion*<br>• *Remind* |
| **Office software** | • Brainstorming, idea generation<br>• Collaboration<br>• Examining student artifacts (Looking at Student Work[9] protocols)<br>• Examine teacher artifacts: Lesson plans, assessments, curriculum planning<br>• Planning<br>• Spreadsheets: Student test results – Identifying areas of teaching or learning difficulty |
| **Social media** | • Co-developing content<br>• Communication<br>• Communities of practice<br>• Peer coaching<br>• Sharing content, ideas, practices, and resources<br>• (See Chapter 5 for a more in-depth discussion of social media) |

Technology can also be used to improve the quality and equity of coaching and mentoring. New York City Public Schools use a data dashboard to capture and analyze coaches' daily activities. The dashboard allows coaches to analyze the focus of their daily activities to ensure that these activities are productive and are helping teachers refine their practice. It helps coaches reflect on how they can improve their coaching work at a school level and serves as a "nudge," encouraging coaches to consider whether there are additional times during the day they can use for classroom coaching (Goldenberg et al., 2019, p. 60).

The dashboard also provides the New York City Department of Education with programmatic and policy supports. For example, by aggregating data, coaches' supervisors and program leaders can consider how to better support coaches and scale improvement. Visually displaying *who* receives coaching—full-time teachers—has prompted discussions around coaching equity: for example, whether long-term substitutes and paraprofessionals should also receive coaching (Goldenberg et al., 2019, p. 61).

While all digital tools may be equally useful for coaching, depending on the coaching task, two tools appear to be more equal than others. The first is videoconferencing software such as *Zoom*, *Skype*, or *Meet*, where coaches can hold meetings with teachers and conduct classroom observations. The second is *WhatsApp*, which, as noted in Chapter 6, was often teachers' go-to tool for collaboration and resource sharing during emergency remote learning in 2020, particularly

[9] Sometimes referred to as "Learning from Student Work:" https://www.nsrfharmony.org/wp-content/uploads/2017/10/atlas_lfsw_0.pdf

for teachers in refugee contexts, such as in Syria, Lebanon, and Jordan, and for teachers in low-resource contexts, such as government schools in India (Anand & Lall, 2021; Burns, in press).

The research on the overall effectiveness of *virtual coaching* or *mentoring* and improved teacher performance, although still nascent, is expanding. There are a few high-quality studies that suggest that virtual coaching is more cost-effective than in-person coaching, and that in-person and virtual coaching interventions can be equally effective in improving student performance (Bruns et al., 2017; Kotze et al., 2019; Kraft et al., 2018). Other studies point to online teachers' general satisfaction with the online mentoring they receive (Dawley et al., 2010). One of the most rigorous studies of video-based coaching was the 2012 Measures of Effective Teaching (MET) study, sponsored by the Bill & Melinda Gates Foundation. Teachers reported that they changed their instructional practices after viewing videos of their teaching that was shared with them by a coach. An evaluation of coaching software showed an effect size of 1.09 standard deviations (SD) for teacher knowledge and 0.66 SD for implementation fidelity of a grade 1 reading intervention (Mathes, 2015).

There is also evidence to the contrary. Cilliers et al. (2018, 2021) examined a virtual coaching program versus on-site coaching in South Africa. Research findings credited the *on-site* coaching intervention as more effective than the virtual one at improving English reading proficiency. Indeed, researchers observed that the virtual program had no "statistically detectable impact on reading proficiency skills" (Cilliers et al, 2018, p. 3). Although on-site coaching was 23% more expensive than virtual coaching, cost-effectiveness analysis shows that it was actually more cost-effective, given its better results.

That coaching online was less effective is confirmed by EDC research and internal data from a two-year coaching program in Indonesia in which 300 teachers received online, face-to-face, or blended coaching (See Figure 16.6). In all measures, teachers who participated in face-to-face or blended coaching demonstrated more interactive uses of technology, more frequent learner-centered practices, better classroom management and organizational techniques, greater self-efficacy in teaching with technology, and stronger efficacy beliefs[10] about students' technology use as opposed to teachers who were coached entirely online (Burns, 2013; Ho & Burns, 2010). Similarly, coaches who were trained and coached exclusively online also reported lower measures of efficacy and knowledge of coaching craft. These findings were particularly noteworthy, since the teachers who received face-to-face coaching came from provinces that were poorer and where teacher quality was typically regarded as weak, while those receiving online coaching were based in provinces that were wealthier and where teacher quality was considered high.[11]

Part of the dissatisfaction expressed by the Indonesian teachers coached online was grounded in what they believed was an incomplete coaching relationship due to distance.[12] This speaks to the criticality of the teacher-coach relationship and its link to teacher satisfaction with coaching (Sailors & Price, 2015). Research results are mixed as to whether that relationship can thrive in a virtual-only environment. Cilliers et al. (2021) reports that "face-to-face engagement" between coaches and teachers may be necessary to build the trusting relationship that is the foundation of coaching, but Kraft's 2018 research suggests otherwise. Apart from this, there appears to be a dearth of educational research on the quality of coach-teacher relationships in virtual versus in-person

[10] Efficacy beliefs involve teachers' beliefs about their own and their students' capabilities (Refer back to *Chapter 8: Developing "Good" Teachers*). These data were observational.

[11] This did not appear to be the result of a ceiling effect as content was quite new; in some cases, the performance of online coaches and coaches declined.

[12] This statement is based on the author's interviews and focus groups with teachers in five Indonesian provinces in 2011.

coaching. Other professions (e.g., health) may have more to share in this arena. One study of executive leadership and business coaching found that coach-coachee online relationships can have the same depth and connectedness as in-person interactions (Grover & Furnham, 2016).

### 16.4.3 Building a Successful Coaching and Mentoring Program

Coaching and mentoring are unique interventions because the coach or mentor *is* the intervention—thus, for coaching and mentoring to be successful, "quality matters more than quantity" (Kraft & Blazar, 2018, p. 72; Kraft et al., 2018, p.27). A systemic review of professional development literature in low- and middle-income countries showed that coaching by "highly qualified, experienced and expert coaches" is effective in changing teaching behaviors of untrained and underprepared teachers (Orr et al., 2013, p. 4).

While there is research highlighting the importance of preparing, training, and supporting coaches and mentors, there appears to be no research showing the superiority of one mentoring or coaching approach over another. However, research does point to a number of discrete factors that influence the effectiveness of coaching and mentoring. Where possible, we separate results based on whether the data refer to coaching or mentoring.

#### Quality

Coaches are *the* key ingredient for the success of instructional coaching programs. The magnitude of coach-level heterogeneity in effectiveness is particularly large when compared to the average effect of coaching programs (Blazar at al., 2022, p.21). A 1.0 SD increase in a coach's effectiveness translates into a 0.2 to 0.35 SD increase in multiple dimensions of a teacher's instructional quality. A 2.0 SD increase in coach effectiveness—or the difference between having a coach at the 84th versus the 16th percentile in the performance distribution—is associated with a 0.4 to 0.7 SD increase in teachers' observed quality of instruction (Blazar et al., 2022, p. 4). Using value-added measures, Blazar et al. (2022) found that teachers of the *most effective* coach score roughly 1.2 SD higher than teachers of the *least effective* coach on instructional quality measures derived from classroom observations, as well as 0.7 SD higher on student-reported measures of classroom experiences (Blazar et al., 2022, p. 7).

#### Preparation

Effective coaches and mentors must possess sound subject knowledge, deep awareness of instructional practice, strong interpersonal skills, and the ability to support mentees' examination of practice (Smith & Ingersoll, 2004). They must understand what coaching and mentoring involve. They need process skills related to their job of working with teachers, including the ability to provide feedback in ways that are resonant; an understanding of which coaching approaches to deploy; skills in managing conflict; change management skills; and communication skills, such as summarizing, shifting, mirroring, and paraphrasing, that move teachers from one performance level to another (Garmston & Wellman, 2013; Spooner-Lane, 2017; Van Nieuwerburgh, 2017). Mentors who do not receive adequate formal training find it more difficult to provide direct feedback and to instigate changes in the mentee's beliefs and teaching practices (Spooner-Lane, 2017). Similarly, a poorly prepared coach "will not only be ineffective but can damage teachers' understanding of coaching and have long-term consequences for their work with other coaches" (Toll, 2019, p. 13). Professional teaching standards that spell out what teachers should know and be able to do at specific career stages can help to guide the preparation and training of coaches and mentors (Reid & Kleinhenz, 2015).

Thus, quality preparation for potential coaches and mentors is essential to effective coaching and mentoring (Abrioux, 2006; Burns, 2013; Ingersoll & Strong, 2011; Orr et al., 2013; Toll, 2019; van Nieuwerburgh, 2017; Van Ostrand et al., 2020). They do need teaching expertise, but teaching experience alone is not enough—coaches and mentors also have to develop the skills that will equip them to be dedicated support professionals and change agents. As such, many nations (particularly those with formal mentoring programs) have ensured that their mentors are able to provide high-quality support. For example, mentor teachers in France, Switzerland, Norway, England, and Israel are required to undergo initial training (Darling-Hammond et al., 2009). In Rwanda, the University of Rwanda College of Education has developed a certification program for teachers and head teachers planning to become coaches or mentors (University of Rwanda College of Education, 2020).

Mentors and coaches also need support. Research points to the importance of this ongoing support in ensuring the quality of a coach or mentor (Burns, 2013; Burns, in press; Stanulis et al. 2012, as cited in Spooner-Lane, 2017). Support can include professional learning communities for coaches and mentors; coaching and mentoring for these coaches and mentors; analysis of data; and study groups.

### Access and availability

Research suggests that access and availability matter—beginning teachers regarded *on-site* mentors who were available as needed to provide immediate support as more valuable than mentors who were *off-site* and visited infrequently. Access and availability of the mentor made it more likely that beginning teachers would stay in the profession (Hallam et al., 2012).

### Dosage

Access matters in coaching and mentoring effectiveness; so too does *dosage*. One study of mentoring in a large urban U.S. district showed that new teachers who receive "higher dosage" mentoring were more likely than new teachers in the low-dosage group to be retained in the district (Caven et al., 2021). Weekly, one-on-one mentoring has been shown to have more positive effects on student achievement than less frequent interactions (Hallam et al., 2012; Fletcher & Strong 2009, as cited in Spooner-Lane, 2017).

Additionally, students whose teachers participate in "full release" models of mentoring—where mentors work full time on mentoring with a full caseload of 12–15 teachers—show greater learning gains than students whose teachers participate in a "partial-release" model, where a teacher teaches full time and mentors one or two teachers (Spooner-Lane, 2017). The research on effective coaching points to its highly individualized supports and sustained and frequent contact as determinants of success (Kraft et al., 2018, p. 9).

### Focus

The focus of coaching and mentoring matter. Studies note that spending more time on lesson and unit planning may be related to greater new teacher retention—one study discovered that 94% of new teachers who reported spending substantial time with their mentor on these were retained, versus 86% of new teachers who did not (Bastian & Marks, 2017; Caven et al., 2021). Research on coaching suggests it works best when it is focused on the teacher's content area; has instructional improvement as its core aim; and is support-focused versus compliance-focused (Kraft et al., 2018, p. 9; see also Audisio et al., 2022; Popova et al., 2016).

### Relationships

Because coaching and mentoring are essentially relationships between two individuals, a trusting, caring connection must be established (Darling-Hammond et al., 2009; Hallam et al. 2012). Indeed, there is research suggesting that the quality of that relationship is related to new teacher retention (Hallam et al., 2012). This speaks to the importance of careful matches between mentors/coaches and teachers in content area or grade level; dedicated time and resources for a coach/mentor and teacher to work together; clearly defined professional responsibilities; the quality and nature of the coach-/mentor-teacher relationship; and the frequency and quality of coach/mentor and teacher interaction as factors that influence coaching and mentoring (Smith & Ingersoll, 2004; Hallam et al., 2012; Sailors & Price, 2015; Toll, 2019; Ingersoll & Strong, 2011; Spooner-Lane, 2017; Caven et al., 2021).[13] Coach-teacher race/ethnicity-matching also predicts changes in teacher practice, emphasizing again that the "relational component of coaching is key to success" (Blazar et al., 2022, p. 1).

Foundational to the coaching or mentoring relationship is trust. Teachers need to know they can trust their coach or mentor and that that person is an ally, so that together they can begin the work of sustained collaboration. This speaks to the importance of separating the coach and mentor's support and accountability roles—a practice that is frequently violated and one that undermines the very foundation of the coach/mentor-teacher relationship (Burns, 2022; Audisio et al., 2022; Popova et al., 2016).

### Mentoring as part of university induction programs

A few studies suggest that, given the natural connections between universities and beginning teachers, university-based induction programs that include mentoring may have specific advantages over school- or district-based programs alone (Reid & Kleinhenz, 2015, p. 55; see also Bastian & Marks, 2017). For example, university-based teacher education programs are familiar with and have partnerships with the districts and schools in their surrounding area as research sites and teaching practicum placements. University faculty know the issues facing beginning teachers, and there is already a reciprocal relationship as, ideally, best practices flow back and forth from the school to the university (Bastian & Marks, 2017). However, universities in general have also been widely criticized for poor preparation of pre-service teachers, thus begging the question of why institutions that may offer poor pre-service instruction should also be charged with teacher support (Akyeampong, 2017; Niemi, 2015; Burns, in press).

That critique notwithstanding, some authors suggest that universities have the resources to direct more targeted supports and research-based strategies and resources to beginning teachers and mentors than do school districts (Bastian & Marks, 2017). For example, school-based mentors might be able to access professional learning at the university, ensuring that mentoring is anchored in a "broader theoretical framework" (Reid & Kleinhenz, 2015, p. 55; see also Howe, 2006). Universities could ensure a successful transition from the university to the classroom for teacher graduates by designing and running the induction program, including undertaking mentoring in schools or school districts that lack resources and personnel (Bastian & Marks, 2017; Howe, 2006).

Although almost every school system across the globe has some sort of nominal teacher-support personnel—from content supervisors to block-group supervisors to circuit inspectors—many of these support staff function in bureaucratic or administrative roles rather than instructional ones. They often evaluate teachers and monitor compliance rather than collaborating with and supporting teachers directly. Such staff may be unable to serve in a support and instruction capacity because they themselves were trained and acculturated in a system that promotes traditional instruction and hierarchical, accountability-based relationships with teachers. Similarly, they may have little opportunity to visit classrooms and little practical experience of actually working with teachers because of other work-related duties.

To support teachers to implement in their classroom what they have learned in distance-based courses, educational entities must build a functioning system of teacher-support personnel, starting with standards for coaches, mentors, and teacher-leaders (Reid & Kleinhenz,

[13] The Center for Great Teachers and Leaders at the American Institutes for Research offers a free mentoring and induction toolkit for high-need contexts. Access it here: https://gtlcenter.org/technical-assistance/toolkits/mi-toolkit

2015). One example of such standards, the *Teacher Leader Model Standards*, contains a series of broadly stated expectations or domains that define critical dimensions of teacher leadership, helping to identify the full range of competencies that teacher-leaders need in order to collaborate with formal school leaders to guide, mentor, and assist teachers in implementing exemplary professional practices that lead to improvements in student learning. Such a support system has to operate concurrently with any type of teacher professional development program, regardless of its mode of instruction and focus. These standards can then frame the type of instruction and preparation system for mentors to allow them to work effectively with, support, and nurture new teachers (Teacher Leadership Consortium, 2011).

## 16.5 Conclusion

Human beings and institutions tend to resist change or embrace it slowly. This tension between the rapid change demanded by professional development and the resistance to change on the part of individuals and organizations means that change is often fraught with upheaval and uncertainty. But *positive* change is necessary for growth and for improvement. It can be highly beneficial if teachers are provided with an array of ongoing supports, but it can be counterproductive, stressful, and futile if they are not. Without ongoing classroom-based support to help teachers internalize what they have learned in their distance courses, the "problem of enactment" will endure. Teachers will continue with the *status quo*, and they will fail to implement or will soon abandon new instructional methods, particularly in the face of difficulties such as a lack of resources, an examination system misaligned with instructional practices, or lack of support from the principal, colleagues, or parents.

The changes wrought by distance-based professional development programs demand the presence of a school-based support person or change agent to strike a balance between competing goals and to move change forward in a thoughtful, pragmatic, holistic way. For pre-service teacher-candidates attempting to successfully fulfill course requirements for a distance-based teacher training course and for in-service teachers hoping to upgrade their qualifications or instructional skills, distance education programs that offer a range of human supports can help mitigate the conceptual, behavioral, attitudinal, and logistical challenges that accompany new learning or change.

Distance learning programs must consider the length, duration, and complexity of the change process in teacher education. Meaningful change is neither fast, cheap, nor easy. Policymakers and designers must be made more cognizant of these issues in relation to teacher change so they can make informed decisions about how best to support teachers in ways that take advantage of existing structures and resources to improve a distance program's effectiveness, build the capacity of support providers, help teachers become successful distance learners, and above all, enable them to implement new ideas and skills with fidelity in ways that ultimately benefit their students.

Citation: Burns, M. (2023). Supporting Distance Learners. In *Distance Education for Teacher Training: Modes, Models and Methods.* (2nd Edition). Washington, DC: Education Development Center.

## References


Abrioux, D. (2006). *Strategic issues in single- and dual-mode distance education: The organizational blending of two Canadian distance universities.* Commonwealth of Learning. https://www.saide.org.za/resources/Library/Abrioux%20-%20Strategic%20Issues%20in%20Single%20and%20Dual%20Mode%20Distance%20Education.pdf

Akiba, M., LeTendre, G., & Scribner, J. (2007). Teacher quality, opportunity gap, and national achievement in 46 countries. *Educational Researcher, 36*(7), 369–387. https://doi.org/10.3102/0013189X07308739

Akyeampong, K. (2017). Teacher educators' practice and vision of good teaching in teacher education reform context in Ghana. *Educational Researcher,* Vol. 46, No. 4, pp. 194–203

Anand, K., & Lall, M. (2021). Teachers' digital agency and pedagogy during the COVID-19 crisis in Delhi. *NORRAG Special Issue, 6*, 64–66. https://discovery.ucl.ac.uk/id/eprint/10138582/

Audisio, A., Taylor-Perryman, R., Tasker, T., & Steinberg, M. (2022). *Does teacher professional development improve student learning? Evidence from leading educators' teacher fellowship model. (EdWorkingPaper: 22-597).* Annenberg Institute at Brown University: https://doi.org/10.26300/ah2f-z471

Bakhshaei, M., Hardy, A., Ravitz, J., & Seylar, J. (2019). *Scaling up classroom coaching for impactful technology use.* Digital Promise. http://hdl.handle.net/20.500.12265/82

Barlow, R. (2021, August 26). Anti-maskers are assaulting teachers and school leaders. What can be done? Three questions for Eleonora Villegas-Reimers, Wheelock chair of special and elementary education. *Boston University Today*. https://www.bu.edu/articles/2021/anti-masker-violence-against-teachers-and-school-leaders/

Bartanen, B., Husain, A., & Liebowitz, D. (2022). *Rethinking principal effects on student outcomes, edworking Paper 22-621.* Annenberg Institute at Brown University. https://edworkingpapers.com/sites/default/files/ai22-621.pdf

Bastian, K., & Marks, J. (2017, February 27). Connecting teacher preparation to teacher induction: Outcomes for beginning teachers in a university-based support program in low-performing schools. *American Educational Research Journal*, *54*(2), 360–394. doi:https://doi.org/10.3102/0002831217690517

Belger, T. (2023, January 12). *In short supply: Cover costs soar as teacher shortages and illness bite*. Schoolsweek. https://schoolsweek.co.uk/school-supply-teachers-illness-cover-recruitment/

Blazar, D., McNamara, D., & Blue, G. (2022). *Instructional coaching personnel and program scalability (EdWorkingPaper: 21-499)*. Annenberg Institute at Brown University. https://doi.org/10.26300/2des-s681

Boeskens, L., Nusche, D., & Yurita, M. (2020, October). *Policies to support teachers' continuing professional learning: A conceptual framework and mapping of OECD data.* OECD Education Working Papers: https://doi.org/10.1787/247b7c4d-en

Boyle, F., Kwon, J., Ross, C., & Simpson, O. (2010). Student–student mentoring for retention and engagement in distance education. *Open Learning: The Journal of Open, Distance and e-Learning*, *25*(2), 115–130. https://doi.org/10.1080/02680511003787370

Breaux, A., & Wong, H. (2003). *New teacher induction: How to train, support, and retain new teachers.* Harry Wong Publications.

Bruns, B., Costa, L., & Cunha, N. (2017). *Through the looking glass: Can classroom observation and coaching improve teacher performance in Brazil?* World Bank Open Knowledge Repository. https://openknowledge.worldbank.org/handle/10986/27962

Buchanan, G. (2019). *Beginning and mentor teachers' perceptions of teacher mentoring processes in primary schools: A case study in Aotearoa New Zealand* [Masters Thesis for the University of Canterbury]. http://dx.doi.org/10.26021/9495

Burns, M. (2010). Not too distant: A survey of strategies for teacher support in distance education programs. *Turkish Online Journal of Distance Education, 11*(2), 108–117. https://dergipark.org.tr/tr/pub/tojde/issue/16908/176338

Burns, M. (2013, December). Staying or leaving? Designing for persistence in an online educator training program in Indonesia. *Open Learning: The Journal of Open and Distance Learning, 28*(2), 141–152. doi: http://dx.doi.org/10.1080/02680513.2013.851023

Burns, M. (2021a, April 12). Can virtual coaching be an effective substitute for in-person coaching? *Global Partnership for Education | Education for All Blog*. https://www.globalpartnership.org/blog/can-virtual-coaching-be-effective-substitute-person-coaching

Burns, M. (2021b). *Background paper prepared for the 2023 Global Education Monitoring report, Technology and education: Technology in education.* United Nations Educational, Scientific and Cultural Organization. https://unesdoc.unesco.org/ark:/48223/pf0000378951

Burns, M. (2022, May 23). The Traps of Donor Funded Coaching and What to Do About Them. *Global Partnership for Education | Education for All Blog*. https://www.globalpartnership.org/blog/traps-donor-funded-coaching-and-what-do-about-them

Burns, M. (in press). *Barriers and supports for technology integration: Views from teachers. Background chapter prepared for the Global Education Monitoring report: Technology and education.* United Nations Educational, Scientific and Cultural Organization.

Burns, M., & Bodrogini, P. (2011). The wisdom of practice: Web 2.0 as a cognitive and community-building tool in Indonesia. In M. Thomas (Ed.), *Digital education* (pp. 167–193). Palgrave Macmillan.

Burns, M., & Lawrie, J. (Eds.). (2015). *Where it's needed most: Quality professional development for all teachers.* Inter-agency Network for Education in Emergencies. https://tinyurl.com/jb3zs5bw

Caven, M., Durodoye, Jr., R., Zhang, X., & Bock, G. (2021). *Variation in mentoring practices and retention across new teacher demographic characteristics under a large urban district's new teacher mentoring program.* Regional Educational Laboratory Northeast & Islands at Education Development Center. https://files.eric.ed.gov/fulltext/ED614819.pdf

Cilliers, J., Fleisch, B., Kotze, J., Mohohlwane, N., Taylor, S., & Thulare, T. (2021). *Can virtual replace in-person coaching? Experimental evidence on teacher professional development and student learning.* RISE Working Paper Series. 20/050: https://doi.org/10.35489/BSG-RISE-WP_2020/050

Cilliers, J., Fleisch, B., Prinsloo, C., & Taylor, S. (2018). *How to improve teaching practice? Experimental comparison of centralized training and in-classroom coaching* (Working Papers). Stellenbosch University. https://EconPapers.repec.org/RePEc:sza:wpaper:wpapers308

City, E., Elmore, R., Fiarman, S., & Tietel, L. (2009). *Instructional rounds in education.* Harvard Educational Publishing Group.

Commonwealth of Learning. (2008). *Education for a digital world: Advice, guidelines and effective practice from around the globe.* http://oasis.col.org/handle/11599/52

Contact North | Contact Nord. (n.d.). *Welcome to Ontario's community-based bilingual distance education and training network.* http://www.contactnorth.ca

Cook, L., & Friend, M. (1995, November). Co-teaching: Guidelines for creating effective practices. *Focus on exceptional children, 28*(3), 1-16. https://pdfs.semanticscholar.org/31ca/3592c18acdd238ce488cd7184017b904b646.pdf

Cray, K. (2022, January 27). *America Is Desperate for Substitute Teachers*. The Atlantic. https://www.theatlantic.com/family/archive/2022/01/america-desperate-substitute-teachers/621379/

Darling-Hammond, L., & Bransford, J. (2005). *Preparing teachers for a changing world: What teachers should learn and be able to do.* Jossey-Bass.

Darling-Hammond, L., Wei, R., Andree, A., Richardson, N., & Orphanos, S. (2009). *Professional learning in the learning profession.* National Staff Development Council.

Darling-Hammond, L., Hyler, M., & Gardner, M. (2017a). *Effective teacher professional development.* Learning Policy Institute. https://learningpolicyinstitute.org/product/effective-teacher-professional-development-report

Darling-Hammond, L.; Burns, D.; Campbell, C.; Gooodwin, A.L.; Hammerness, K.; Ling Low, E.; McIntyre, A.; Sato, M.; Zeichner, K. (2017b). *Empowered educators: How high-performing systems shape teaching quality around the world.* National Center on Education and the Economy.

Dawley, L., Rice, K., & Hinck, G. (2010, November). *Going virtual! 2010. The status of professional development and unique needs of K–12 online teachers.* Department of Educational Technology Boise State University. https://stu.westga.edu/~bthibau1/MEDT%207472-%20Huett/IAND%20B%20%232%20%20GOING%20VIRTUAL.pdf

Desimone, L., & Stuckey, D. (2014). Sustaining teacher professional development. In L. Martin, S. Kragler, D. Quatroche, & K. Bauserma (Eds.), *Handbook of professional development in education: Successful models and practices, Pre-K–12* (pp. 467–482). Guilford Publications.

Dikkers, A. (2018). Social Interaction in K–12 Online Learning. In K. Kennedy, & R. Ferdig (Eds.), *Handbook of research of K12 online and blended learning* (2nd ed., pp. 509–522). Carnegie Mellon University ETC Press. https://www.learntechlib.org/p/182993/

Doig, B., & Groves, S. (2011). Japanese lesson study: Teacher professional development through communities of inquiry. *Mathematics Teacher Education and Development, 13*(1), 77–93. https://files.eric.ed.gov/fulltext/EJ960950.pdf

Donohoo, J. (2017). *Collective efficacy: How educators' beliefs impact student learning.* Corwin Press.

Dudley, P. (2019). *Lesson study: A handbook.* Lesson Study UK. https://lessonstudy.co.uk/wp-content/uploads/2012/03/new-handbook-revisedMay14.pdf

Educational Institute of Scotland. (2021). *EIS*. Teacher Induction Scheme. https://www.eis.org.uk/probationers/inductionscheme

Ellis, N., Alonzo, D., & Nguyen, H. (2020, June). Elements of a quality pre-service teacher mentor: A literature review. *Teaching and Teacher Education, 92.* https://doi.org/10.1016/j.tate.2020.103072

European Commission/EACEA/Eurydice. (2019). *Teaching careers in Europe: Access, progression and support*. Publications Office of the European Union. https://data.europa.eu/doi/10.2797/309510

Fixsen, D., Naoom, S., Blasé, K., Friedman, R., & Wallace, F. (2005). *Implementation research: A synthesis of the literature.* University of South Florida, Louis de la Parte Florida Mental Health Institute, The National Implementation Research Network (FMHI Publication #231). doi:10.1.1.610.6226

Fullan, M. (2005). *Leadership & sustainability: Systems thinkers in action.* Corwin Press.

Fulton, K., Burns, M., & Goldenberg, L. (2005, December). Teachers learning in networked communities: The TLINC strategy. *Phi Delta Kappan, 87*(4), 298-305.

Garmston, R., & Wellman, B. (2013). *The adaptive school: A sourcebook for developing collaborative groups.* Rowman & Littlefield.

Goldenberg, L., Wanta, V., & Fletcher, A. (2019, December). A dashboard view of coching. *The Learning Professional, 40*(6), 58–61. https://learningforward.org/wp-content/uploads/2019/12/a-dashboard-view-of-coaching.pdf

Gray, L., & Taie, S. (2015). *Public School teacher attrition and mobility in the first five years: Results from the first through fifth waves of the 2007-08 beginning teacher longitudinal study. First look. NCES 2015-337.* National Center for Education Statistics. https://files.eric.ed.gov/fulltext/ED556348.pdf

Grissom, J., Egalite, A., & Constance, A. (2021). *How principals affect students and schools: A systematic synthesis of two decades of research.* http://www.wallacefoundation.org/principals

Grover, S., & Furnham, A. (2016, July 14). Coaching as a developmental intervention in organisations: A Systematic review of its effectiveness and the mechanisms underlying it. *PLoS One, 11*(7). doi:10.1371/journal.pone.0159137

Hallam, P., Chou, P., Hite, J., & Hite, S. (2012). Two contrasting models for mentoring as they affect retention of beginning teachers. *National Association of Secondary School Principals (NASSP) Bulletin, 96*(3), 243–278. https://doi.org/10.1177/0192636512447132

Hanushek, E., Kain, J., & Rivkin, S. (2004, Spring). Why public schools lose teachers. *Journal of Human Resources, XXXIX*(2), 326–354. doi:10.3368/jhr.XXXIX.2.326

Hennessy, S., D'Angelo, S., McIntyre, N., Koomar, S., Kreimeia, A., Cao, L., . . . Zubairi, A. (2022). Technology use for teacher professional development in low- and middle-income countries: A systematic review. *Computers and Education Open, 3*. EdTech Hub: https://doi.org/10.1016/j.caeo.2022.100080

Hill, H. (2020, February 21). *Teacher PD Gets a Bad Rap. But Two Approaches Do Work.* Education Week. https://www.edweek.org/leadership/opinion-teacher-pd-gets-a-bad-rap-but-two-approaches-do-work/2020/02

Hill, H., Papay, J., & Schwartz, N. (2022). *Dispelling the Myths: What the Research Says About Teacher Professional Learning.* The Research Partnership for Professional Learning. Annenberg Institute for School Reform at Brown University.

Ho, J., & Burns, M. (2010). *Distance Education Pilots for Indonesia: Evaluation of pilot 1 decentralizing basic education 2.* Education Development Center & United States Agency for International Development.

Hope, A. (2006). *Factors for success in dual mode institutions.* Commonwealth of Learning. http://hdl.handle.net/11599/203

Hord, S., Rutherford , W. L., Huling-Austin, L., & Hall, G. (2006). *Taking charge of change.* Southwest Educational Development Laboratory.

Howe, E. (2006). Exemplary teacher induction: An international review. *Educational Philosophy and Theory, 38*(3), 287–297. https://doi.org/10.1111/j.1469-5812.2006.00195.x

Hsieh, F., Wong, K., & Wang, T. (2013). Are Taiwanese and Singaporean future teachers similar in their mathematics-related teaching competencies? *International Journal of Science and Mathematics Education, 11*(4), 819–846. https://doi.org/10.1007/s10763-013-9418-8

Huber, S., & West, M. (2002). Developing school leaders: A critical review of current practices, approaches and issues, and some directions for the future. In K. Leithwood, & P. Hallinger (Eds.), *Second international handbook of educational leadership and administration* (pp. 1071–1101). Kluwer Academic Publishing.

Ingersoll, R., & Strong, M. (2011, June). The impact of induction and mentoring programs for beginning teachers: A critical review of the research. *Review of Education Research, 81*(2). https://doi.org/10.3102/0034654311403323

Johnson, S., & Birkeland, S. (2003). Pursuing a "sense of success:" New teachers explain their career decisions. *American Educational Research Journal, 40*(3), 581–617. https://doi.org/10.3102/00028312040003581

Joyce, B., & Showers, B. (2002). *Student achievement through staff development* (3rd edition). Association for Supervision and Curriculum Development.

Jung, H., Kwauk, C., Nuran, A., Perlman Robinson, J., Schouten, M., & Sheikh Islam, T. (2016, July). *Lesson study, Scaling up peer-to-peer learning for teachers in Zambia.* Center for Universal Education Brookings Institute. http://dx.doi.org/10.2139/ssrn.3956230

Kennedy, M. (1999). The role of preservice teacher education. In L. Darling-Hammond, & G. Sykes (Eds.), *Teaching as the learning profession: Handbook of teaching and policy* (pp. 54–86). Jossey Bass.

Killion, J., & Harrison, C. (2008). *Taking the lead: New roles for teachers and school-based coaches.* National Staff Development Council.

Kotze, J., Fleisch, B., & Taylor, S. (2019). Alternative forms of early grade instructional coaching: Emerging evidence from field experiments in South Africa. *International Journal of Educational Development, 66*(C), 203–213.

Kraft, M., & Blazar, D. (2018). Taking Teacher Coaching To Scale. *Education Next, 18*(4), 68-74. Education Next. https://www.educationnext.org/taking-teacher-coaching-to-scale-can-personalized-training-become-standard-practice/

Kraft, M. A., Blazar, D., & Hogan, D. (2018). The effect of teacher coaching on instruction and achievement: A meta-analysis of the causal evidence. *Review of Educational Research, 88*(4), 547–588.

Landry, S., Anthony, J., Swank, P., & Monesque-Bailey, P. (2009, May). Effectiveness of comprehensive professional development for teachers of at-risk preschoolers. *Journal of Educational Psychology , 101*(2), 448–465. doi:10.1037/a0013842

Liu, P., Rim, S., Min, L., & Min, K. (2022). The surprise of reaching out: Appreciated more than we think. *Journal of Personality and Social Psychology*. https://doi.org/10.1037/pspi0000402

Lotan, R., & Burns, D. (2019). *The instructional leadership corps: Teachers leading sustainable professional learning in their communities.* Learning Policy Institute. https://files.eric.ed.gov/fulltext/ED603437.pdf

Loyalka, P., Popova, A., Li, G., Liu, C., & Shi, H. (2017). *Unpacking teacher professional development. REAP Working Paper 314.* Stanford Center on Global Policy and Development. https://kingcenter.stanford.edu/sites/g/files/sbiybj16611/files/media/file/1009wp_0.pdf

Mathes, P. (2015). *Instructional coaching: Science, reality, and innovation.* Center for Development and Learning.

Mendenhall, M., Bowden, L., Cha, J., Collas, S., Falk, D., French, S., . . . Skinner, M. (2017). *Strengthening teacher professional development: Local and global communities of practice in Kakuma refugee camp, Kenya.* https://www.eccnetwork.net/resources/strengthening-teacher-professional-development

Modan, N. (2022, May 26). *"Waiting for the next thing:" What it's like teaching after a mass shooting*. K–12 Dive. https://www.k12dive.com/news/waiting-for-the-next-thing-what-its-like-teaching-after-a-mass-shooting/624473/

Moir, E. (1990). *Phases of first year teaching.* California New Teachers' Project. https://www.aliefisd.net/cms/lib/TX01917308/Centricity/Domain/140/Phases%20of%20First%20Year%20Teachers%20Text.pdf

Moskowitz, J., & Stephens, M. (1997). *From students of teaching to teachers of students: Teacher induction around the Pacific Rim.* U.S. Department of Education.

National Center for Education Statistics. (2017). *Number and percentage of public schools that had staff with specialist/academic coaching assignments, and among those schools, the percentage that had staff with a particular specialist or academic coaching assignment, by selected school characteristics*. National Center for Education Statistics: https://nces.ed.gov/surveys/ntps/tables/Table_5_042617_fl_school.asp

National Center for Education Statistics. (2022, March 3). *U.S. Schools report increased teacher vacancies due to COVID-19 pandemic, New NCES data show*. National Center for Education Statistics: https://nces.ed.gov/whatsnew/press_releases/3_3_2022.asp

National Commission on Teaching and America's Future. (2003). *No dream denied: A pledge to America's children.* National Commission on Teaching and America's Future.

Neuman, S., & Wright, T. (2010). Promoting language and literacy development for early childhood educators: A mixed-methods study of coursework and coaching. *The Elementary School Journal, 111*(1), 63–87. https://doi.org/10.1086/653470

New Teacher Center. (2019, October). *Counting the cost: A commitment to educational equity that yields returns*. https://newteachercenter.org/resources/counting-the-cost-a-commitment-to-educational-equity-that-yields-returns/

Niemi, H. (2015). Teacher professional development in Finland: towards a more holistic approach. *Psychology, Society, & Education,* Vol. 73, No. 3, pp. 279–294. http://repositorio.ual.es/bitstream/handle/10835/3932/Niemi%20En%20ingles.pdf

Ontario College of Teachers. (2014). *Transition to teaching 2014.* Ontario College of Teachers. https://www.oct.ca/-/media/PDF/Transition%20to%20Teaching%202014/EN/Main_report_eng.pdf

Open Learn Create. (2017). *Active teaching and learning for Africa: Zambia education school-based training (ZEST).* Open Learn Create. https://www.open.edu/openlearncreate/course/index.php?categoryid=450

Organisation for Economic Co-operation and Development. (2009). *Teaching and learning: An international survey. 2008 technical report.* Organisation for Economic Co-operation and Development. http://www.oecd.org/dataoecd/16/14/44978960.pdf

Organisation for Economic Co-operation and Development. (2020). *Education at a glance 2020: OECD indicators.* OECD Publishing. https://doi.org/10.1787/69096873-en.

Orr, D., Westbrook, J., Pryor, J., Durrani, N., Sebba, J., & Adu-Yeboah, C. (2013). *What are the impacts and cost effectiveness of strategies to improve performance of untrained and under-trained teachers in the classroom in developing countries? A systemic review.* Australian Aid, The University of Sussex, ePPI Centre, Institute of Education University of London. https://ora.ox.ac.uk/objects/uuid:e6191fc7-f4b1-4f6b-a021-5b9773bdf573/download_file?file_format=pdf&safe_filename=Undertrained_teachers_2013_Orr.pdf

Piper, B., Destefano, J., Kinyanjui, E., & Ong'ele, S. (2018). Scaling up successfully: Lessons from Kenya's Tusome national literacy program. *Journal of Educational Change, 19*(3), 293–321. https://doi.org/10.1007/s10833-018-9325-4

Podolsky, A., Kini, T., Darling-Hammond, L., & Bishop, L. (2019). Strategies for attracting and retaining educators: What does the evidence say? *Education Policy Analysis Archives, 27*(38). https://doi.org/10.14507/epaa.27.3722

Popova, A., Evans, D., & Arancibia, V. (2016). Training teachers on the job: What works and how to measure it. *Policy Research Working Paper 7834, Background paper to the 2018 world development report.* The World Bank Group. http://documents1.worldbank.org/curated/en/122031474915232609/pdf/WPS7834.pdf

Prescott , W., & Robinson, B. (1993). Teacher education at the Open University. In H. Perraton (Ed.), *Distance education for teacher training* (pp. 287–315). Routledge Press.

Quartz, K., Thomas, A., Anderson, L., Masyn, K., Lyons, K., & Olsen, B. (2008). Careers in motion: A longitudinal retention study of role changing among early-career urban educators. *Teachers College Record, 110*(1), 218–250. https://doi.org/10.1177/016146810811000102

Reid, K., & Kleinhenz, E. (2015). *Supporting teacher professional development: Literature Review.* Department of Foreign Affairs and Trade.

Ring, H., & West, A. (2015). Teacher retention in refugee and emergency settings: The state of the literature. *International Education Journal: Comparative Perspectives, 14*(3), 106–121.

Rogers, E. (1995). *Diffusions of innovations (4th ed.).* Free Press.

Sailors, M., & Price, L. (2015). Support for the improvement of practices through intensive coaching (SIPIC): A model of coaching for improving reading instruction and reading achievement. *Teaching and Teacher Education, 45*, 115–127. https://doi.org/10.1016/j.tate.2014.09.008

Sawahel, W. (2014, August 15). African virtual university to launch 29 e-learning centres. *University World News*. https://www.universityworldnews.com/post.php?story=20140815124144866.

Sinyolo, D. (2007). *Teacher supply, recruitment and retention in six anglophone Sub-Saharan African countries: A report on a survey conducted by Education International in The Gambia, Kenya, Lesotho, Tanzania, Uganda and Zambia.* Education International. https://healtheducationresources.unesco.org/sites/default/files/resources/EI%20Africa%20Study.pdf

Smith, T., & Ingersoll, R. (2004). What are the effects of induction and mentoring on beginning teacher turnover? *American Educational Research Journal, 41*(3), 681–714. https://doi.org/10.3102/00028312041003681

Spooner-Lane, R. (2017). Mentoring beginning teachers in primary schools: research review. *Professional Development in Education, 43*(2), 253–273. doi:10.1080/19415257.2016.1148624

Teacher Leadership Consortium. (2011, March). *Teacher leader model standards teacher leadership exploratory consortium.* Educational Testing Service. https://www.ets.org/content/dam/ets-org/pdfs/patl/patl-teacher-leader-model-standards.pdf

Teacher Task Force. (2021). *Teachers at the heart of education recovery: What does the latest data tell us about the state of the world's teachers?* Teacher Task Force. https://teachertaskforce.org/news/teachers-heart-education-recovery-what-does-latest-data-tell-us-about-state-worlds-teachers

The World Bank Group. (2016, April). *How Shanghai does it: Insights and lessons from the highest-ranking education system in the world.* The World Bank Group. http://hdl.handle.net/10986/24000

Timperley, H., Wilson, A., Barrar, H., & Fung, I. (2007). *Teacher professional learning and development: Best evidence synthesis iteration.* Ministry of Education. http://www.educationcounts.govt.nz/publications/series/2515/15341

Toll, C. (2019, December). Effective coaching begins with the hiring process. *The Learning Professional, 40*(6), 12–16. https://learningforward.org/wp-content/uploads/2019/11/effective-coaching-begins-with-the-hiring-process.pdf

United Nations Educational, Scientific and Cultural Organization. (2022, October). *Transforming education from within: Current trends in the status and development of teachers. World Teachers Day.* UNESDOC Digital Library: https://unesdoc.unesco.org/ark:/48223/pf0000383002

University of Rwanda College of Education. (2020). *Continuous professional development certificate in educational mentorship and coaching (CPD-EMC), Student manual, Module 1, 5th edition.* Coaching and Mentoring for Professional Development of Head Teachers and Teachers.

van Nieuwerburgh, C. (2017). *An introduction to coaching skills: A practical guide* (2nd ed.). Sage.

Van Nostrand, P., Noakes, S., Shah, Z., & Luna, L. (2022, February). *An overlooked indicator of edtech quality: The use of learning sciences research.* Digital Promise. https://doi.org/10.51388/20.500.12265/150

Van Ostrand, K., Seylar, J., & Luke, C. (2020). *Prevalence of coaching and approaches to supporting coaching in education.* Digital Promise, Google and Learning Forward. http://hdl.handle.net/20.500.12265/91

Wong, H. (2004). Induction programs that keep new teachers teaching and improving. *NASSP Bulletin, 88*(638), 41–58. https://doi.org/10.1177/019263650408863804

Wynn, S., Carboni, L., & Patall, E. (2007, June). Beginning teachers' perceptions of mentoring, climate, and leadership: Promoting retention through a learning communities perspective. *Leadership and Policy in Schools, 6*(3), 209–229. https://doi.org/10.1080/15700760701263790

Section II. Chapter 17

# ASSESSING DISTANCE LEARNERS

## Table of Contents

**Best Practice:** Successful distance learning programs use a range of formative and summative assessments to improve instruction and to accurately measure teachers' knowledge, skills, competencies, and attitudes.

## 17.1 Overview

At its core, assessment is the relationship between the "instruction learners receive and what they actually learn as a result" (Black & William, 2018, p. 20). As such, assessment is a critical component of any distance education program. However, in some cases, assessment may be the weakest component of a distance program.

**Figure 17.1**
**Assessment Versus Evaluation**

"Assessment" and "evaluation" are often used synonymously, but they are different. Assessment *in this guide* refers to individuals, whereas evaluation refers to programs (although that rule does not apply in real life—individuals can be evaluated, and programs can be assessed).

Assessment refers to any of a variety of procedures used to obtain information. It includes distinct types of measures of knowledge, skills, and performance, usually in the service of learning. Assessment may have an evaluative component —a summative assessment, such as a final exam— that places a value or judgment on performance.

Evaluation, the focus of the next chapter, is a set of procedures for determining the value or overall worth of a program. It essentially examines impact or outcomes based on predefined criteria.

Because of the "open" and "distant" nature of Open and Distance Learning, these programs face a particular dilemma in assessing pre- and in-service teacher matriculation: how to measure teacher-candidates' process of learning, the products of their learning, and their progress in learning; how to assess their "fitness" as teachers and how to do so in ways that contain direct, observable evidence of "teaching in action;" and how to validate or authenticate the written work of learners they may never see (Letseka & Pitsoe, 2013).

Many distance-based continuing education programs may not be required to summatively assess whether and what teachers have learned as a result of the program. Or they may use standardized tests that measure out-of-date skills—focusing on declarative knowledge versus procedural knowledge or conceptual and epistemological knowledge (Niess, 2011).[1]

Additionally, constrained financial resources, a lack of access to adequate technologies, logistics, and a lack of qualified test-design specialists and trained assessors may make it difficult to support more valid and realistic performance-based assessments, such as in-class observations of teacher performance, personalized assessments, or digital portfolios of teacher work. Finally, many entities may not wish to assess teacher learning; their aim simply may be to get teachers and

[1] This categorization is often described as *knowing that* (declarative knowledge); *knowing how* (procedural knowledge—application of skills); and *knowing why and wherefore* (conceptual knowledge—deep understanding, and methods of knowledge acquisition) (Niess, 2011).

teacher-candidates in and out of the distance education system as effortlessly as possible.

This chapter focuses on *assessing* teacher learning and performance in a distance education program. It discusses how successful distance education programs have overcome many of the above issues by using a range of assessment methods as appropriate. It advocates that assessment be designed to gain evidence about learners' capabilities, and this evidence be used to adjust instruction to better meet learners' needs (Black & Wiliam, 2018; Heritage, 2010).

While this chapter focuses on assessment, Chapter 18 will discuss *evaluating* distance education programs. Because assessment and evaluation are so closely linked, Figure 17.1 explains the distinction.

## 17.2 Assessment in Teacher Education Programs

Assessment is essentially a vehicle to gather some idea of what a pre-service teaching candidate or in-service teacher knows, can do, values, and believes (Letseka & Pitsoe, 2013). It is typically categorized as *formative*—a low-stakes assessment, which is not scored, and the information from which is used to improve teaching and learning processes—or *summative*, which is a high-stakes assessment, the aim of which is to produce a product that is then evaluated or judged using some form of a grade or mark (Black & Wiliam, 2018).

Assessments within distance education programs generally adhere to this formative-summative dyad and in so doing, generally serve the following purposes:

- **Assessment to support learning.** Formative assessment is typically used to support learning by informing the instructor how well, or poorly, learners understand content so that the instructor can reteach information or change the course of instruction.
- **Assessment for certification.** Assessment can certify that a teacher candidate has attained a defined set of benchmarks that govern professional entry into teaching. For example, aggregated learner results from exams and projects or national and international benchmarks and tests of teachers' knowledge and skills (such as the Praxis in the U.S., the Licensure Exam for Teachers in the Philippines, or the National Teacher Qualification Test in South Korea) provide evidence of teacher candidates' attainment of a set of learning outcomes or a professional body of knowledge. This certification also has an accountability dimension.
- **Assessment for sorting and selection.** Assessment in this category can be used for choosing, sorting, or screening teacher candidates into or across particular positions, programs, career tracks, or awards based on assessment results. For example, they can be used to determine promotion to another level of teaching as part of a career ladder; reward or acknowledge performance; or transfer a teacher to a more prestigious school (Archer, 2017).

Thus, the inferences made about the purposes of assessment often drive the assessment deployed, and the purpose of each is specific to an intended outcome. There are numerous assessment methods that can be utilized for these three distinct purposes of assessment, as Figure 17.2 outlines.

As seen from Figure 17.2, many of the above higher-order thinking assessment activities will require well-designed rubrics. A rubric is a scoring guide that assesses open-ended projects, performances, and tasks that focus on higher-level thinking skills or social-emotional skills. It lists criteria or "what counts" for a piece of work as well as gradations of quality. There are essentially two types of rubrics: *holistic* and *analytic*. A *holistic* rubric requires the teacher to score the overall process or product as a whole, without judging each part separately.

**Figure 17.2**
**Common Types of Assessments and Their Advantages and Disadvantages (Adapted from Downing, 2006; also see Commonwealth of Learning and Asian Development Bank, 2008, pp. 4–14)**

| Assessment | What It Assesses | Advantages | Considerations |
|---|---|---|---|
| Tests: Select response (e.g., multiple choice, true/false, matching) Learners select the correct response among a series of options. | • Facts<br>• Understanding of ideas<br>• Application of principles | • They are a direct measure of the learner's knowledge of a domain.<br>• With the exception of multiple-choice tests, they are easy to construct and easy to grade.<br>• They can assess many more topics broadly.<br>• They facilitate faster return of exam results to learners.<br>• They produce accurate, objective, and reproducible scores. | • It is difficult to create good multiple-choice tests (especially with good "distractors").<br>• They measure a very narrow range of knowledge (identification and recall of information) rather than skills or procedural knowledge (how to do something) or higher-level thinking.<br>• Poorly developed tests make guessing easy. |
| Tests: Constructed response (e.g., fill-in-the-blank, cloze, short answer, sentence completion) Learners "construct" or supply their own response. (Also includes essays—see below.) | • Facts<br>• Understanding of ideas<br>• Application of principles | • They are a direct measure of the learner's knowledge of a domain.<br>• They can assess many more topics broadly.<br>• They allow for ease of partial credit scoring.<br>• With constructed-response tests, there is less of a predilection to guess, as on a select-response test. | • Some (e.g., Fill-in-the Blank) measure a limited depth of knowledge (identification and recall of information).<br>• Others (e.g., Short Answer) can assess logic, reasoning, and problem solving. |
| Essays | • Understanding of ideas<br>• Ability to organize information<br>• Ability to develop an argument, support it with ideas and evidence, and formulate a conclusion based on arguments and evidence | • They are a direct measure of learner's higher-order thinking (logic, reasoning, problem solving, thinking skills, procedural and conceptual skills) as well as written communication skills. | • They require scoring rubrics, otherwise grades are unreliable.<br>• Much depends on the quality of the essay prompt itself: its length, specificity versus generality, clarity, and its focus on specific learning outcomes. |

| Assessment | What It Assesses | Advantages | Considerations |
|---|---|---|---|
| Essays *(continued)* | • Ability to communicate in a variety of written forms<br>• Written fluency in the language of instruction | • They allow learners to express their knowledge in a less constrained, more open format than a test (such as multiple-choice, short answer, fill-in-the-blank). | • Reliability and validity depend on well-trained raters, scoring scales, and well-developed prompts.<br>• Essays take longer to grade.<br>• Without well-designed rubrics, the subjectivity of grader is always a major concern.<br>• Essays require writing to be taught in curriculum to master rhetorical, mechanical, and grammatical conventions.<br>• Large language models, such as GPT or Bloom, can generate essays for learners. |
| Oral Assessments | • Oral fluency in general and in the language of instruction<br>• Reasoning, problem solving, interpersonal skills<br>• Speaking, poise, thought processes | • They are a direct measure of learner's higher-order thinking (logic, reasoning, problem solving, thinking skills, procedural and conceptual skills) as well as oral communication skills.<br>• The give-and-take nature of conversation/oral communication may be more natural to the learner.<br>• They can be used to confirm other assessments. | • Oral assessments require a well-developed rubric.<br>• They may be time-consuming to mark, particularly if recorded.<br>• It may be difficult to standardize questions.<br>• There is the possible introduction of bias due to the personal nature of the assessment.<br>• Cultural considerations can impede their effectiveness: learner shyness, hierarchy, lack of comfort of female learner being orally assessed by a male instructor.<br>• Performance anxiety may be greater here since oral assessments are typically conducted in-person. |

| Assessment | What It Assesses | Advantages | Considerations |
|---|---|---|---|
| Classroom observations | • Practice-based skills (e.g., teaching practicum, micro-teaching, or simulated teaching)<br>• Cumulative body of knowledge in action<br>• The ability to transfer information and principles to novel and authentic situations<br>• The capacity to deal with "real life" classroom situations *in situ* | • An observation is a direct measure of teaching ability and is thus performance-based.<br>• Observations are a more authentic and direct form of assessment.<br>• Observations when done well are empirical and objective. | • Observations require an observation form or tool and well-trained observers.<br>• The tool should be high-inference to capture nuances in instructional quality and to measure teacher progress over time.<br>• They require established protocols demarcating the length of observation, the position of the observer, and pre- and post-observation meetings.<br>• Assessing teachers' practice requires ongoing observations to capture breadth of teachers' skills.<br>• Observations will be examined in greater depth in Section 17.4. |
| Projects, Theses, Capstone Projects | • Reveal depth of procedural and conceptual knowledge and mastery of a particular topic<br>• Creativity and organization of information<br>• Theses: Writing, knowledge, and thinking skills | • Projects/theses or capstones mainly assesses cumulative procedural and conceptual knowledge of the teacher candidate or teacher.<br>• They can assess harder-to-measure constructs such as affect, creativity, behaviors, aptitudes.<br>• They can assess learner's depth of knowledge, understanding of theories, and research<br>• They combine instruction and assessment—the teacher candidate learns as she creates her own assessment product.<br>• They assess the totality of a learner's work. | • They call for more open-ended assessments (journals, portfolio, video, examples of learner work).<br>• They require an analytic rubric.<br>• They are time-consuming to grade.<br>• With projects, there is potential subjectivity and a lack of validity and reliability without very well-developed guidelines and a reliable rubric.<br>• Capstones, in particular, are often open-ended and requirements may differ according to programs or instructors (e.g., product might be a short video versus a paper versus a performance). |

| Assessment | What It Assesses | Advantages | Considerations |
|---|---|---|---|
| Portfolios | • Same as points above<br>• Multiple levels of assessment (knowledge of facts, analysis and evaluation of information, and self-reflection) | • Portfolios encourage learners to display knowledge and understanding in multiple formats, especially digital or Web-based ones.<br>• They assesses the learner's participation, processes of learning, progress, as well as final product of their learning. | • Without video or audio, capturing teacher behavior or practice, portfolios are not a direct measure of teacher performance.<br>• They require an analytic rubric.<br>• They are time-consuming to grade.<br>• They suffer from potential subjectivity and lack of validity and reliability without a very well-developed analytic rubric. |

An *analytic* rubric scores separate, individual parts of the product or performance first, then adds the individual scores to obtain a total score. They are matrix-like, with performance levels that show delineations on quality and with specific and measurable descriptors (e.g., 1–4, "emerging" to "proficient"). Analytic rubrics are usually preferred when a fairly focused type of response is required (i.e., for performance tasks in which there may be one or two acceptable responses and creativity is not an essential feature of the learners' responses.)

The above table also outlines both the potential and the conundrum of assessment. Almost every method discussed in Figure 17.2 can be utilized for both formative and summative purposes. Thus, assessment is less about the *methods* that distance programs use, and more about the *inferences* they draw about learners from these assessment outcomes (Black & Wiliam, 2018). Where inferences relate to the status of the learner or concern their future potential, then the assessment is functioning *summatively*. Where the inferences relate to the kinds of actions that would best help the student learn, then the assessment is functioning *formatively* (Black & Wiliam, 2018, p. 3).

## 17.3 Technology-Based Assessment

Technology holds numerous benefits for assessment in distance education programs. This section discusses some of the key benefits of computer-based assessments, computer adaptive testing, and technologies to support formative assessment.

### 17.3.1 Computer-Based Assessments

Technology has completely transformed assessment from the era of Margaret, the distance learner encountered in the Foreword of this guide, who waited months for her assessment results. Current computer-based assessments (CBAs) provide versatility, flexibility, and automation in terms of what can be measured within any distance education system. CBAs can:

- **Allow for multiple-test administrations.** Learners can take multiple, short, reliable assessments administered during the academic year. The data gathered from these assessments can be correlated with national standards so that teacher-learners can be measured on these standards (Reville et al., 2005).
- **Use learning analytics for personalized support.** Information derived from individual

learner characteristics, learner choices, and assessment data can be collected, measured, and analyzed. Learning analytics can be used to better understand learner needs; optimize course offerings, design, and instruction; provide distance education programs with the information needed to support learner progression; and enable personalized, rich learning (Tempelaar et al., 2015).

- **Improve the testing experience.** Game-based assessment apps such as *Kahoot!* and *Quizlet* and the quizzing and rewards features of tools such as *Duolingo* make assessment more fun and engaging, less "test-like" and thus less stressful for learners (Wyatt-Smith et al., 2019).
- **Provide a fuller picture of learner achievement and capabilities.** Through their ability to create dynamic and individualized assessments, CBAs can produce a more rounded and complete picture of a learner's achievements and capabilities to help instructors identify interventions, supports, and personalized pathways for learning (Wyatt-Smith et al., 2019).
- **Provide immediate and varied feedback to learners.** Computers can score tests in real time, allowing distance instructors to make real-time instructional changes based on assessment evidence and providing learners with real-time information about their progress and performance (Black & Wiliam, 2018; Wyatt-Smith et al., 2019). There are essentially two types of feedback: verification and elaboration. Verification indicates whether an answer is correct, and elaboration provides information to guide the learner toward the correct answer (Kulhavy & Stock, 1989). This feedback can be part of an overall "knowledge building cycle" (Timperley et al., 2007) where, depending on the computer application, instructors can program the system to provide learners with more elaborate feedback and with just-in-time help to resolve gaps in learner understanding (Myung et al., 2020). Tools powered by artificial intelligence (AI), such as *ChatGPT, Gradescope, Grammarly*, or *Cognii* can provide learners with verification feedback while adapting assignments according to assessment results. As natural language models, like *ChatGPT*, continue to evolve, they may also be able to offer elaboration feedback to learners.
- **Vertically align tests.** Tests can be anchored to assess the same core knowledge at increasing levels of difficulty (criterion-based testing) (Reville et al., 2005).
- **Horizontally align tests.** Tests can be scored in such a way that learners can be compared against one another (norm-referenced), which may be critical for sorting and choosing pre-service teacher candidates for teaching posts, scholarships, or further education. Raw test scores could be given phase-wise or as a total. Learners could receive a letter grade or percentile score to determine their relative position *vis-à-vis* other learners (Reville et al., 2005).
- **Include ipsative or growth measures.** Tests measure individual growth over time, so programs are able to benchmark where learners should be at the end of a course of study based on tests from the beginning of a course of study (Reville et al., 2005).
- **Help learners with disabilities.** Technology tools such as screen readers, magnification tools, and text-to-voice or voice-to-text applications can help learners with visual, auditory, and motor impairments; learners with dyslexia; and learners who simply need more time to complete a test. Using AI-powered voice assistants, visually impaired learners can use voice commands to have text read aloud to them. AI and augmented reality applications can help deaf and hearing-impaired learners read by translating texts into sign languages (Burns, 2021).
- **Streamline and automate marking.** Tools to support grading and marking, such as *RubiStar*, *GradeAssist*, *OrangeSlice*, *Hot Potatoes*, and *eMarking Assistant*, have long been popular supports for instructors wishing to eliminate the tedium of marking learners' work, especially open-ended assignments.

Increasingly AI is being harnessed to power formative and summative assessment tools based on instructor specifications. For example, *IntelliMetric* and *e-rater* use past evaluations of long-form essays to create a rubric and framework for evaluating new assignments, which it then uses to assess learners' work and offer feedback on learner work. *E-rater* weighs key features of the learner's writing skills and provides feedback. Peer-to-peer assessment can be made easier via tools such as *CrowdGrade*r, *peerScholar*, *Cocertify*, and *PeerWise* (Contact North | Contact Nord, 2020).

- **Automate large-scale assessments.** Computer-based assessments can reduce manual labor so that certain tasks are performed more efficiently, at a higher volume, and at scale without creating undue burdens on instructors, undue expense for an education system, and unduly delayed results for learners (Burns, 2021).
- **Generate big data for policy and planning.** Beyond distance education, large-scale computer-based assessments, particularly cross-national ones, generate vast quantities of longitudinal data that have been analyzed and used by governments for international benchmarking of learners, analyses of countries' educational conditions, the formulation of education policies related to teaching and learning, and instructional improvement. Some of the more familiar cross-national exams are Southern and Eastern Africa Consortium for Monitoring Educational Quality (SACMEQ), Program for the Analysis of Education Systems (PASEC), the Program for International Student Assessment (PISA) and PISA for Development (PISA-D), Trends in International Mathematics and Science Study (TIMMS), and Progress in International Reading Literacy Study (PIRLS).

### 17.3.2 Computer Adaptive Testing

One powerful category of computer based assessment is Computer Adaptive Tests (CATs). Computer Adaptive Tests can be used with a number of distance-based modes, such as multimedia learning, online learning, and mobile learning (see Chapters 4–6 of this guide). CATs are technology-based or online testing systems created by content specialists, psychometricians, programmers, and Web designers. They contain large banks of test items and use item response theory (IRT) for pre-calibration, determination of the item parameters (discrimination and difficulty), establishing learners' performance levels and scoring, as well as other functions.

CATs "adapt" questions to be easier or more difficult based on the learner response to previous questions. This calibration or adaptation allows for a precise and quicker measurement of a learner's knowledge using a smaller number of test items. CATs can be diagnostic (identifying learners in need of more academic support), formative (informing instructors of the learner's grasp of material), or summative (as a final determination of learning). They are typically administered online, so scoring is computerized, and results disseminated quickly. They allow for accurate measurement and a shorter and more targeted testing experience for learners (E. Cascallar, personal communication, August 29, 2022).

### 17.3.3 Technology-Supported Alternative Assessments

CBA is not simply about CATs or computer-based testing. As Chapters 4, 5, and 6 discuss, interactive technologies allow for multiple and flexible types of alternative (i.e., non-test) assessments—discussions, projects, and performance-based assessments (e.g., mixed reality, digital learning games, and simulations)—that provide a wealth of authentic, engaging, and holistic assessment opportunities for distance learners, both synchronous and asynchronous, Web-based and non-Web-based, and formative and summative.

Using *traditional assessments (computer-based tests)* and *immersive ones (augmented reality, virtual reality, mixed reality, extended reality, and simulations)* can create more responsive instruction for learners; assess teachers' instructional skills in authentic, or nearly authentic, environments; measure higher-level skills; and ensure teachers' quality, readiness, and fitness to teach (Black & Wiliam, 2018; Gee & Shaffer, 2010; Timmis et al., 2015; Wyatt-Smith et al., 2019). *Digital learning games, virtual worlds, simulations,* and *immersive environments* can provide a developmental sequence of challenges that gradually increase in difficulty so that learners are working at their highest abilities. These tools can also be used to assess the learner's ability to collaborate, problem-solve, and employ systems thinking (Gee & Shaffer, 2010; Buckley et al., 2021).

In addition to these multimedia applications, *eye-tracking and facial recognition software* are increasingly used to assess difficult-to-measure skills, such as higher-level thinking skills, the social-emotional skills of persistence, creativity, and self-regulation, and learners' affective states, such as engagement or frustration (Buckley et al., 2021). These assessments could be enhanced via the use of "think-aloud" protocols so learners could explain their decisions (e.g., in a digital learning game), their rationale for such decisions, and their attitudes and affective states while wrestling with difficult concepts or tasks (Gee & Shaffer, 2010, p. 14; see also Wyatt-Smith et al., 2019).

*Electronic portfolios, digital representations, projects,* and *digital collections of their work* allow learners to showcase their processes of learning and progress in a distance-based course. *Online discussions*—whether they are synchronous and video-, audio-, or text-based, or asynchronous and text-based, as on an LMS discussion board—provide evidence to assess emerging understandings of concepts and theories, as well as skills such as reasoning, evaluation, and argumentation (Myung et al., 2020).

Extensive writing via *word processing or a digital writing tool*—versus handwriting—where learners put forth a thesis statement, support their idea with evidence, and arrive at a conclusion—has been shown to improve writing scores *if* learners go through the complete writing cycle of drafting, editing, revising, and rewriting (Warschauer, 2009).

Developing *blogs* and multimedia presentations, particularly with curated hyperlinked resources, can demonstrate learners' understanding of an issue, their appreciation of its complexity, and their knowledge of appropriate resources that address the issue.

Audio- and Web-conferencing tools allow learners to present information to one another and the instructor and to engage in debates about a particular teaching-related or content-based issue.

Using *mobile phones*, teacher-learners can be assessed on national language abilities (Hindi, Arabic, Urdu, Swahili) or participate in oral assessments, and their scores can be immediately tabulated and returned in real time. Similarly, learners can use the texting features of mobile phones and quickly send answers to a multiple-choice or closed-response quiz or test, which can be analyzed and tallied, with the score returned via text messaging (Morris et al., 2021).

Finally, *back-end data from LMSs*—the number of logins, time on task, and number of discussion posts— can be linked to hard assessment data, such as examinations or performance-based data, to provide a fuller assessment of a learner's effort and progress in an online course.

### 17.3.4 Improving Technology-Based Assessments

While exciting and promising, assessment via technology has numerous issues, not least of which are privacy and data integrity issues. For the purposes of this chapter, however, we focus on two issues that can enhance or undermine technology-based assessments as part of distance learning courses: good test design and academic dishonesty (cheating).

#### Improving testing

While tests often are critiqued as imperfect measures of teachers' skills, they are a staple in the assessment repertoire, and select- and constructed-response tests offer numerous advantages, as outlined in Figure 17.2. Their greatest advantages may be twofold: First, if tests are designed well, examinees who answer correctly should be higher performers than those examinees who do not—and their answers should be based on expertise versus random guessing.

Second, quizzes and tests support "retrieval practice," which consolidates new learning (Roediger III & Butler, 2011). Retrieval practice is more commonly known by its original moniker, the "testing effect" (See Figure 11.5 in Chapter 11). When learners know they will be assessed on material, they learn it better and retain it longer than if they just study the material *without* a test (Batsell Jr. et al., 2017; Brame & Biel, 2015). The "(mere) presence" of a quiz enhances learning in part because it contributes to reduced "mind wandering," improved self-regulation, increased task-relevant behaviors such as note taking, and enhanced calibration predicted and actual performance (Haagsman et al., 2020, p. 722; Schacter & Szpunar, 2015, p. 64).

But tests only confer benefits when designed well. Poor test design is particularly problematic in distance programs that lack skilled psychometricians or assessment specialists. The biggest perpetrators of poor test design are the most frequently administered type of tests—multiple-choice tests—because they often fail to challenge learners to reason or analyze rather than simply memorizing information. One U.S.-based national study of test-bank questions from 77 university-level introductory biology courses estimated that 93% of the questions tested levels 1 and 2 on Bloom's Cognitive Domains of Learning (Knowledge and Comprehension) (Momsen et al., 2017). Bloom's Taxonomy is outlined in Figure 17.7.

There are ways to improve multiple-choice tests, as Figure 17.3 outlines.

**Figure 17.3**
**Improving the Design of Multiple-Choice Tests (Brame, 2013; Burns, 2018)**

| Parts of the Question | Design Guidelines |
|---|---|
| The stem | • Should be clear, relevant, and brief.<br>• Should be a question or partial statement.<br>• Should be directly linked to the curriculum and the most important topics taught. |
| Alternatives (responses, answers) | • Create clear, concise, direct alternatives.<br>• Should be mutually exclusive, homogeneous, and presented in logical order.<br>• Avoid double negatives.<br>• Avoid the use of "All of the above" or "None of the above." Those alternatives reward learners who don't know the answers. If such options must be used, do so with caution and ensure that it is the correct response approximately 1 in 4 times.<br>• All answers—the correct answer and the distractors (the incorrect answers)—should be consistent in length, style, and construction. Learners should not be able to guess the right answer because it looks different from the wrong answers.<br>• Increase the plausibility of distractors by choosing distractors based on common learner errors. |

| | |
|---|---|
| Other guidelines | • Ensure that tests are valid and measuring what they are supposed to and what's been taught.<br>• Weight test content according to the amount of time spent on a particular topic.<br>• The learner should not be able to guess the correct answer from the way the response is written.<br>• Pay attention to language. Avoid grammar, spelling, and mechanics errors which may make it difficult for learners to even understand the question and possible alternatives<br>• Avoid categorical terms, such "always," or "never." There's no such thing as "always" or "never," and this is a giveaway.<br>• As long as all alternatives are plausible, the number of alternatives can vary among items. (There is a minor difference in difficulty, discrimination, and test score reliability among items containing two, three, and four distractors.)<br>• Avoid complex multiple-choice problems (i.e., alternatives such as 1 and 2; 2 and 3; 1 and 3; 1, 2, and 3)<br>• Each question should stand alone and be unrelated to or disconnected from other questions. The point is to avoid "double jeopardy," where if a learner answers one question incorrectly, another answer also will be incorrect.<br>• Pilot the test when finished creating it—either with a non-test taking learner or using AI-driven chatbots which, if prompted correctly, can provide feedback on test construction, clarity of directions and distractors. |

In addition to multiple-choice tests, specifically, research suggests that testing in general also can be improved by employing the following strategies:

- **Vary test structures.** Avoid assessing learners using the same type of test repeatedly. For example, instructors can administer an open-ended question for one test and short answer-questions for another or use fill-in-the-blanks questions instead of multiple-choice, since fill-in-the-blank questions require learners to retrieve information rather than just recognize the correct answer (Hultberg et al., 2018). A variety of types of tests allows instructors to gather different types of data about a variety of learners' knowledge and skills (Tropman, 2014).
- **Use pre-class quizzes as part of a flipped approach.** Flipped classrooms, as discussed in *Chapter 5: Online Learning*, typically assign learners to read text or watch a video before their in-person or synchronous class. By administering a quiz after this pre-class reading and before the actual class, assessment can help instructors diagnose learners' levels of understanding; determine who has done required readings; guide instructors on what they should focus on in a face-to-face or online session; and provide ongoing opportunities for retrieval practice (Brame & Biel, 2015; Tropman, 2014).
- **Employ collaborative tests and quizzes.** Test anxiety is a real phenomenon for many learners, with measurable physiological and psychological impacts that hinder performance (Heissel et al., 2021; Pandey & Kapitanoff, 2011). Collaborative quizzes can alleviate this anxiety for learners with higher levels of test anxiety. Learners can take an individual poll or quiz, then discuss with peers and retake the quiz. They each can take the quiz individually and decide among the group whose quiz to submit, or they can take the quiz together at the same time (Pandey & Kapitanoff, 2011).
- **Use low stakes and ungraded quizzes.** Not every assessment requires a grade, and

grading everything can have the unintended effect of causing learners to focus on a number or letter result versus actual learning. Distance instructors can diversify quizzes by including non-graded ones. With ungraded quizzes or assignments, learners can wrestle with a concept or practice a skill without fear of being judged or evaluated. They can receive credit with a checkmark, thereby acknowledging completion or effort instead.

- **Use assessment experts to design tests, especially summative ones.** Correct test design is complex and involves many requirements about the characteristics and number of items in the item bank, correct calibration of the items, and application to the correct population of learners (E.C. Cascallar, personal communication, August 29, 2022). While *Chapter 13: Preparing Distance Instructors* advocates for distance instructors to learn assessment practices, high-stakes test design involves skills best left to an assessment expert.
- **Be conscious of stereotype threat.** Testing can induce documented disproportionate psychological stressors on some learners—often ethnic, religious, and racial minorities; low-income learners; and females—thus heightening the risk of "stereotype threat." Stereotype threat is the fear of being "viewed through the lens of a negative stereotype, or the fear of doing something that would inadvertently confirm that stereotype" and has been shown to increase the test-taker's anxiety, reduce self-efficacy, and hinder actual performance (Steele, 1999). Stereotype threat is a critical, although under-explored, issue in teacher education. But it is highly germane since many current and future teachers are female and non-White, and since it occurs most commonly in STEM subjects—science, technology, engineering, and mathematics—content areas in which teacher shortages are most acute (Heissel et al., 2021; See, 2022; Spencer et al., 2016; Steele, 1999).

Technology can help to mitigate some of the effects of stereotype threat. For example, in some cases, traditionally underserved learners, who are more likely to be adversely affected by stereotype threat, may do better in online classes of traditionally "difficult" subjects, such as Algebra I, versus in face-to-face classrooms (Heissel, 2016). Computer-adaptive assessments that tailor content to learners' skill level in a tested domain can improve the reliability of the results and reduce learner frustration, mitigate stereotype threat, and potentially increase motivation (Burns, in press).

Most important, however, are non-technology solutions to stereotype threat. One is having distance instructors who reflect the diversity of their learners. A second involves instructors cultivating a personal, though professional, relationship with their learners. Third is the necessity of employing gender-responsive pedagogies. For example, university-level female learners experience significant improvement in self-efficacy relative to their male counterparts when instructors include activities that promote "social persuasion" (encouragement to adopt an idea, attitude, or stance), such as teamwork, group discussion, and collaborative projects (Espinosa et al., 2019). Active learning strategies, particularly those focused on inquiry, appear to correlate positively with female academic performance in mathematics (Johnson et al., 2020).

Finally, some instructors may have to recognize their own biases as well as fixed notions of intelligence and the purposes of assessment (Audisio et al., 2022; Black & Wiliam, 2018; Dweck, 1999, as cited in Heritage, 2010). They should thus exercise caution in communicating the purposes of test-taking—for example, avoid telling learners that the purpose of the test is judgment or evaluation of intelligence or ability, or telling or intimating to learners that one gender does better or worse than another in math, science, or reading (Heissel et al., 2021; Steele, 1999).

## Addressing academic dishonesty

In addition to poor test design and practices, computer-based testing in particular, and assessment in general, is affected by a second weakness—cheating. The ease of finding information online also makes it easier for examinees to cheat, plagiarize, and "game" the technology system, manipulating the technology features of games, Intelligent Tutoring System or Computer Aided Instruction to arrive at the correct answers instead of actually wrestling with content (Baker et al., 2010).

The extent of cheating online is unknown. In some surveys, 93% of instructors and 95% of learners say that learners are *likely* to cheat, plagiarize, and copy-and-paste from the World Wide Web without attribution—but real data are hard to come by, and the perception may be far from reality (Wiley Publishing, 2020). What is known is that learners are more likely to cheat when they are under pressure; when they feel alone or unsupported and are unmotivated; when they feel the rewards of cheating outweigh the risks; and when they have a poor or non-existent relationship with the instructor (Lederman, 2020; Maeda, 2019). Whatever the root cause, issues of plagiarism and cheating pose the most fundamental threat to assessment in teacher distance education programs, raising existential questions about the purpose and validity of teacher assessments (Letseka & Pitsoe, 2013).

Digital citizenship and appropriate online communications were discussed in *Chapter 14: Preparing Distance Learners*. But the rubric of "digital citizenship" also encompasses academic integrity and ethical uses of technology (Wiley Publishing, 2020). Digital citizenship is not simply for children and adolescents but is an important mindset and skill for their teachers as well. While many education systems stress digital citizenship for adult educators—not just students—many others do not.

Different distance education systems will have different approaches to issues of online cheating, plagiarism, and violation of copyright by pre- and in-service teachers. Some may have no policies or proscriptions against such behaviors. Some may be high-trust programs that focus on educating teacher-learners about academic integrity (or not), and trust that the executive functioning and moral values of such teachers will deter them from academic dishonesty. Some systems may adopt zero-trust policies and control technology to such an extent that cheating may be extremely difficult.

The best approach to minimizing academic dishonesty may be a combination of educating and trusting teacher candidates, strong academic policies, good pedagogy, and careful design of assessments. Figure 17.4 enumerates approaches for potentially reducing cheating, copyright violations, and plagiarism in CBAs and online courses.

**Figure 17.4**
**Approaches to Reduce Computer-based Cheating and Plagiarism**

| Approach | Suggested Actions |
|---|---|
| Education | • Educate learners about the importance of plagiarism, fair use, copyright, and academic integrity. |
| Policies | • Ensure that every online course has an honor code that explicitly details what constitutes cheating and the repercussions of cheating. Have learners co-design and validate this honor code.<br>• Create and enforce strong academic honesty policies and acceptable use policies.<br>• Ban cell phones and other devices in examination rooms (Wiley Publishing, 2020). |

| Approach | Suggested Actions |
|---|---|
| Instruction | • "Teach better:" More learner-centered, collaborative, higher-order, personalized instruction versus traditional, rote-based learning to make cheating harder (Lederman, 2020).<br>• Provide learners with low-stakes quizzes and scaffolded assessments to practice their skills, ability, and knowledge without worrying about grades (Lederman, 2020). |
| Assessment design | • Create collaborative assessments so learners feel supported and are less likely to cheat for fear of hurting their peers, and because it is simply harder to do so (Lederman, 2020).<br>• Create "open-book" tests (Lederman, 2020).<br>• Provide learners with choice in terms of their assessments.<br>• Design exams with conditional branching—where an exam moves to a different question based on a certain answer or condition being met.<br>• Pose questions that relate to specific and unique course events, as opposed to general concepts, as deterrents to plagiarism.<br>• Use a range of assessment formats—for example, computer-based, performance-based, and face-to-face. |
| Assessment administration | • Stagger the time of assessments and impose time limits (Wiley Publishing, 2020).<br>• Randomly sequence exam questions, provide learners with different essay questions, or provide the same assessments but with components that vary among learners (Wiley Publishing, 2020).<br>• Assign different examination questions to different learners.<br>• Employ paper-based tests and in-person individual oral assessments.<br>• For high stakes assessments, administer them in a central location with proctors and invigilators. |
| Technical solutions | • Copy and paste essays into a Web-based search engine to determine authorship; use plagiarism detection tools such as *Turnitin*, *GPTZero*, *Plagiarism Checker X*, and Microsoft *Word*'s "Similarity" feature (under "Editor"), to detect plagiarism. |
| Technical solutions *(continued)* | • Employ a computer-based virtual proctoring system that installs a proctor (a camera) at each computer workstation to monitor that learner throughout the exam. The room also can be outfitted with cameras that provide a bird's-eye view. Once there is evidence that a learner has cheated, the computer-based exam locks down and remains that way until video recordings are examined and a decision is reached.<br>• Lock down browsers during online exams.<br>• Design and develop basic password certificates based on authentication methods (Chirumamilla & Sindre, 2019).<br>• Use sophisticated biometrics to identify users, so that one friend cannot take an exam for another (Chirumamilla & Sindre, 2019).<br>• Use improved facial recognition software tools to help authenticate the identity of the test taker (Chirumamilla & Sindre, 2019). |

## 17.4 Better Assessment Within a Distance Education System

There are several strategies for developing both formative and summative assessment of learners within any distance education model. We discuss some of the major ones here.

### 17.4.1 Develop Standards as Determinants of Success

The myriad skills and behaviors associated with good teaching often make measuring teacher quality or assessing the fitness of a pre-service candidate or an in-service teacher difficult—hence the reliance on grades and examination scores. Perhaps the most critical component of assessing teachers' readiness, fitness, or quality is to design standards for performance, instruct teachers according to these standards, and then measure teacher performance against them.

Standards can be *normative* (comparing one learner's performance with that of another); *criterion-based* (comparing a learner's performance with an empirically derived level of proficiency, such as a cut score that determines whether a learner has mastered a particular skill); or *ipsative* ("growth" model standards that involve using the learner's prior performance as the basis for comparison with his or her current performance) (Hosp, 2010, p. 5). Understanding the different types of standards is critical for test design, administration, and interpretation of assessment results.

### 17.4.2 Do Assessment *with* Teachers Not *to* Them

Within distance education programs, the teacher-learners who are being assessed have themselves often been missing from participation in the conceptualization, design, and administration of assessment. Since teaching and learning involve both instructors and learners, assessment should be a collaborative endeavor between "both parties in order to produce the best performance in teaching and learning" to create a shared "understanding of the criteria and standards by which quality learning will be assessed" (Letseka & Pitsoe, 2013, p. 204). As is often advocated for student assessment, teacher-learners must be involved in the assessment process itself.

"Flexible assessment" advocates that teachers be given voice in choosing the types of assessments that best represent their learning progression and that yield the best possible information and insights to improve teaching effectiveness and learning quality. As part of teacher education programs, teachers should learn how to design assessments for their own students, how to analyze and interpret assessment data, and how to implement strategies for leveraging data to adapt and modify instruction (Letseka & Pitsoe, 2013). This gap between the intent and implementation of assessment, and between instructors and learners, could begin to be bridged if instructors and distance program designers planned assessments as if learning—*their* learning—mattered most (Letseka & Pitsoe, 2013).

### 17.4.3 Treat Summative Assessments as Opportunities for Teaching and Learning

The distinctions between formative and summative assessment are often confusing. Homework may be the classic example of such confusion—it is thought of as formative (to assess for learning and to inform instruction). But the very act of grading it and using these grades to make a final determination about learner performance is summative (Black & Wiliam, 2018).

Black & Wiliam (2018) argue that summative assessments can, and should, be used, not just summatively but *formatively* as well. They can inform changes in instructor planning and implementation of courses or how best to work with future learners. They also may be formative for learners themselves, helping them reflect on the "strengths and weaknesses of their achievements in ways that might help them re-direct their energies in future work" (Black & Wiliam, p. 12).

### 17.4.4 Use Formative Assessment to Support Mastery Learning

Traditional instruction in a distance program often involves organizing the curriculum into chronological units or sequential blocks and assessing learners' understanding of the material at the end of each unit (Guskey, 2010, p. 53; see also Heritage, 2010). Yet, learning theory informs us that learners, such as pre-and in-service teachers, move through stages of learning from acquisition to fluency at different paces and that these stages often are unconnected to the sequence of topics (Hosp, 2010). Similarly, *assessment theory* states that we learn best when assessment is part of, not separate from, instruction. Thus, rather than assessing teacher-learners at one final level as a summative exercise independent from instruction, distance education courses should integrate assessment into instruction and use formative assessment to support teacher-learners at each stage of their learning. Bloom (1971) referred to this approach as *mastery learning*,[2] a process that involves the following steps:

1. **Diagnostic pre-assessment with pre-teaching.** Instructors administer a short pre-assessment to learners before instruction to determine whether they have the prerequisite knowledge and skills for success in the content they are about to study.
2. **Initial instruction.** The instructor then provides high-quality group instruction that is research-based, adapted to local conditions, and is differentiated to help learners at various stages of the learning process.
3. **Progress monitoring through regular formative assessment.** Following the initial instruction, the distance instructor administers a quick test that assesses learners' understanding and reinforces the most important learning objectives.
4. **Corrective instruction ("reteaching").** Following the formative assessment, the instructor provides corrective instruction or reteaching of the skills and concepts in which learners demonstrated difficulty. Reteaching involves making accommodations in the types of materials used and differentiating instruction—for example, by offering one-to-one tutoring for some learners, "think aloud" protocols with another, or having other learners engage in peer tutoring.
5. **A second formative assessment.** Following the above corrective activities, learners are given a second, similar type of formative assessment that helps determine the effectiveness of the corrective instruction, allows them to demonstrate proficiency in the concept, and provides a more reliable measure of learners' competencies than one, singly administered assessment.
6. **Enrichment or extension activities.** Mastery learning offers enrichment activities to provide challenging learning experiences to learners who do not need corrective instruction. This form of differentiated instruction allows learners who have easily grasped content to immerse themselves in more challenging learning situations, while the distance instructor offers remedial and corrective instruction to those who need it (Guskey, 2010, pp. 54–57).

While a distance instructor might typically lead this mastery learning for pre-service teachers, it may also be part of a coaching program for in-service teachers.

### 17.4.5 Measure Teacher Performance—Not Simply Knowledge

Ultimately, teacher learning at its foundation is about applied learning in an authentic context. While it is important to assess teacher knowledge *about* or *of* teaching, more important is a performance-based assessment measuring a teacher's ability to teach in a real place of practice—a classroom—as part of a teaching practicum (as discussed in Chapter

[2] Like many concepts in education, mastery learning has evolved and developed a slightly different but related meaning that now focuses on competencies that students, particularly in higher education, must master according to standards or national qualification frameworks (NQFs). The African Continental Qualifications Framework (ACQF) focuses on employability skills and examines the comparability, quality, and transparency of qualifications and supports lifelong learning: https://acqf.africa/. The European Union's National Qualifications Framework allows users to examine and compare NQFs across the E.U: https://europa.eu/europass/en/compare-qualifications

13), as part of an induction program (as outlined in Chapter 16), or as part of some kind of professional in-service program. The most common and direct measure is a classroom observation instrument. Classroom observation instruments are often rubric-like in their design and can be classified as either "low-inference" or "high-inference" in nature (see Figure 17.5).

A low-inference instrument, or "a category instrument," may be a checklist of observable indicators of teacher practice (Rosenshine, 1970, p. 281). These tools are easy to complete and can be administered by either less experienced or well-trained classroom observers. However, they measure only the presence or frequency of a behavior—not the quality—nor do they capture the complexity, breadth, and depth of teacher classroom practice.

High-inference tools, or rating systems, incorporate descriptive information or "constructs" of classroom practice and rate these along some sort of scoring scale (such as a Likert scale, from 1–5). With high-inference classroom observation tools, the observer must infer the constructs to be rated—such as the clarity of presentation or organization of learning—recording the frequency through such scales as "consistently," "sometimes," or "always" (Rosenshine, 1970). Because they involve a high degree of interpretation and inference, these observation forms should be used by well-trained observers who understand the purpose of the assessment, who have clear expectations of what each performance level looks like in practice, and who have undergone reliability training. Although they are more demanding to use, high-inference classroom observations, if used well, yield information that is both reliable and valid, better capturing the quality, complexity, and intricacies of classroom instruction (Rosenshine, 1970).

Distance education programs—specifically those with a unique focus, such as a particular reading program or instructional approach—may develop their own classroom observation tools to measure fidelity of implementation or transfer of learning. Developing reliable, valid, sensitive high-inference classroom observation tools that accurately measure specific and empirical constructs is particularly challenging. If not

**Figure 17.5**
**Characteristics of High- Versus Low-Inference Classroom Observation Systems (Adapted from Rosenshine, 1970)**

| Characteristics | Low-Inference Observations | High-Inference Observations |
|---|---|---|
| **General description** | Descriptive | Inferential |
| **Recording procedures** | Categories | Signs and scale |
| **Items** | Low-inference (observation) | High-inference (judgment and interpretation) |
| **Format** | Checklist/binary (yes/no) | Likert scale or some other continuum |
| **Coding** | Simple coding | Multiple coding |
| **Focus** | Frequency | Quality |
| **Observer skill required** | Low | High |
| **Reliability** | Low | High |

designed well, they may be not simply ineffective, but even harmful. Figure 17.6 outlines the purpose, appropriateness, strengths, and weaknesses of classroom observation tools. It is critical to remember that observations are a snapshot in time—one measure of potentially years of teaching—and should be combined with other forms of data before making determinations about an individual teacher's quality or ability.

Given the challenge of developing high-quality high-inference observation tools that reliably assess nuances of behavioral changes, distance education programs may want to avail themselves of the many established classroom observation tools that can be used to assess teacher performance. Examples include the Stallings Classroom Snapshot, the Marzano Teacher Evaluation Model, the

**Figure 17.6**
**Classroom Observation Tools**

| Purpose |
|---|
| Directly assess the actual classroom practices of teachers. Unlike a survey, which is almost a secondary source of information, this measure is a primary source—direct and empirical. |
| **Appropriateness** |
| • Assess evidence of instructional changes, content knowledge, improved professional competencies.<br>• A classroom observation form can assess only measurable and visible outcomes.<br>• Teachers can be assessed along a continuum (low to high) or based on a checklist (yes/no).<br>• Tools can be quantitative and qualitative. |
| **Strengths** |
| • The assessor is directly observing practice, so there is no "interference," as with surveys where teachers can hide true opinions.<br>• Its performance-based nature makes it more objective, empirical, and valid than other types of measurement tools.<br>• It records a fixed set of teacher behaviors, lending itself (in the best-case scenario) to focusing on discrete areas of teacher behavior that can be targeted for improvement. |
| **Weaknesses** |
| • It is surprisingly hard to do good observations—issues of observer bias, observer boredom, confirmation bias, Hawthorne effect (people often perform better when being observed), "halo" effect (judging a certain teacher "high" based on prior positive impressions), performance bias (people rehearse for observer), and indeterminacy are common. Therefore, observer training is a must.<br>• High-inference observation forms demand that an observer be very well trained and able to differentiate among performance levels (using 4- and 5-point scales). |

### Cost Considerations

- High: Site selection, sufficient sample size (for a large-scale program, this would be in the hundreds); training for observers; transportation for observers; joint agreement by observers (filling out one observation protocol between them).
- Transcribing and analyzing qualitative information, quantitative data analysis, and report writing all add to cost.

Classroom Assessment Scoring System (CLASS), the Classroom Observation Toolkit for Early Grade Reading Improvement, and the Danielsen Framework. The classroom observation tool selected, adapted, or created by a distance program should be fit for purpose; include clear, observable, and measurable expectations based on standards of instructional excellence; utilize a standardized observation and scoring protocol; have an evidence base that proves its reliability and validity; and use multiple ratings (i.e., be high-inference) and multiple measures (The New Teacher Project, 2011, p. 3).

## 17.4.6 Integrate Feedback into All Stages of Assessment

*Chapter 9: Professional Development* focused on the importance of feedback in teachers' professional development, and *Chapter 13: Preparing Distance Instructors* emphasized that timely, actionable feedback is associated with online learners' satisfaction with an online course. The most fundamental benefit of feedback may be that its significant, measurable effects on learner performance are at the core of good assessment.

Feedback is a highly diverse construct with multiple:

- *types* of feedback: intrinsic and extrinsic, concurrent and terminal, immediate and delayed, and separate and accumulated;
- *recipients* for feedback (a class, small group, an individual learner);
- *deliverers* of feedback (instructor, learners, a software program, the learner);
- feedback *inflection points* (stepwise, answer-wise, the final results of an assessment, or as part of an actual task); and,
- *purposes* of feedback (motivation, knowledge of information, knowledge about one's performance) (Druckman & Bjork, 1994, p. 50).

Feedback helps learners close the gap between where they are in the learning process and where they should be. It consists of the following four stages that constantly "loop back" or form a cycle:

1. **Evidence.** The data or information about performance should be measured and stored.
2. **Communication.** Information is conveyed to the individual, not as raw data but in a format that makes it emotionally resonant and relevant to the person.
3. **Consequence.** The information must illuminate a specific path forward.
4. **Action.** The individual recalibrates behavior, makes choices, and acts on them (Goetz, 2011, p. 130). The cycle/loop begins again, ideally with each loop becoming shorter and more narrowly focused (Bandura, 1986).

Feedback, like assessment, is essential to continuous improvement. Giving individuals a clear goal and the means of evaluating their progress toward that goal increases the likelihood that they will attain their goal (Bandura, 1986).

### 17.4.7 Design Assessments That Measure Higher-Order Thinking

It is easier, faster, and less expensive to design assessments that measure learners' recall of discrete and decontextualized facts versus higher-order thinking skills. Yet as every professional knows, beyond the academic environment, we are rarely measured on our ability to furnish declarative knowledge (facts). Rather, we are judged on our professional skills, conceptual knowledge, procedural knowledge, aptitudes, and disposition.

Although there are numerous types of knowledge-based taxonomies (e.g., Marzano's taxonomy of educational objectives or Sternberg's triarchic theory of intelligence), most enduring is Bloom's taxonomy of the cognitive domains of learning. For Bloom, learning occupied a continuum—from "lower level" or "lower order" thinking skills such as *knowledge* and *comprehension* to "higher level" or "higher order" learning or thinking skills *such as application, analysis, synthesis,* and *evaluation.* All of these are outlined in Figure 17.7.

**Figure 17.7**
**Cognitive Domains of Learning (Bloom, 1956)**

| Levels (Orders) of Learning/ Thinking Skills | Competence | Skills Demonstrated |
|---|---|---|
| Lower-order learning/ thinking skills | Knowledge | • Observation and recall of information<br>• Knowledge of dates, events, places<br>• Knowledge of major ideas<br>• Proficiency in subject matter<br>*Question cues:*<br>list, define, tell, describe, identify, show, label, collect, examine, tabulate, quote, name, who, when, where |
| | Comprehension | • Understand information<br>• Grasp meaning<br>• Translate knowledge into new context<br>• Interpret facts, compare, contrast<br>• Order, group, infer causes<br>• Predict consequences<br>*Question cues:*<br>summarize, describe, interpret, contrast, predict, associate, distinguish, estimate, differentiate, discuss, extend |

| Levels (Orders) of Learning/ Thinking Skills | Competence | Skills Demonstrated |
|---|---|---|
| Higher-order learning/ thinking skills | Application | • Use information<br>• Use methods, concepts, theories in new situations<br>• Solve problems using required skills or knowledge<br>*Question cues:*<br>apply, demonstrate, calculate, complete, illustrate, show, solve, examine, modify, relate, change, classify, experiment, discover |
| | Analysis | • See patterns<br>• Organize parts<br>• Recognize hidden meanings<br>• Identify components<br>*Question cues:*<br>analyze, separate, order, explain, connect, classify, arrange, divide, compare, select, infer |
| | Synthesis | • Use old ideas to create new ones<br>• Generalize from given facts<br>• Relate knowledge from several areas<br>• Predict, draw conclusions<br>*Question cues:*<br>combine, integrate, modify, rearrange, substitute, plan, create, design, invent, compose, formulate, prepare, generalize, rewrite, what if? |
| | Evaluation | • Compare and discriminate between ideas<br>• Assess value of theories, presentations<br>• Make choices based on reasoned argument<br>• Verify value of evidence<br>• Recognize subjectivity<br>*Question cues:*<br>assess, decide, rank, grade, test, measure, recommend, convince, select, judge, explain, discriminate, support, conclude, compare, summarize |

Distance-based assessment systems are faced with the challenge of preparing teachers to teach in a 21st-century educational and economic environment that emphasizes Bloom's "higher-order thinking skills." For teachers to help students develop such skills, teachers themselves must develop these "critical-thinking" faculties. And for teachers to develop these skills, distance education systems must instruct, model, and assess teacher-learners in higher-order ways and do so while assessing both the product of learning and the thinking process of learners (Royal & Guskey, 2015). Higher-level thinking for teachers is particularly crucial in a knowledge-based economy and in an era of rampant social media disinformation.

As Figure 17.8 demonstrates, assessing higher-order thinking skills demands a variety of distinct assessment methods and tasks.

Figure 17.8
Specific Strategies for Assessing Higher-Order Thinking (Brookhart, 2010, pp. 144–147)

| To assess how well learners can . . . | Provide this kind of material . . . | And ask learners to . . . |
|---|---|---|
| Focus on a question/ identify the main idea | • Text, speech, problem, policy, or experiment and results | • Identify the main issue, main idea, problem, and explain their reasoning |
| Analyze arguments | • Text, speech, or experimental design | • Identify what evidence the author gives that supports/contradicts the argument<br>• Identify assumptions that must be true to make the argument valid<br>• Explain the logical structure of the argument (including irrelevant and contradictory structures) |
| Compare and contrast | • Two texts, events, scenarios, theories, experiments, or works of art | • Identify elements in each<br>• Organize elements based on their similarities and differences |
| Evaluate materials and methods for their intended purposes | • Text, speech, problem, policy, or experiment and results | • Identify the author/designer's purpose<br>• Identify elements in the work<br>• Judge the value and validity of these elements in accomplishing the intended purpose<br>• Explain their reasoning and support it with evidence |
| Put unlike concepts together in new ways | • Complex task/problem | • Generate multiple solutions<br>• Produce something new |
| Make or evaluate a *deductive* conclusion | • Statement or premise | • Draw a logical conclusion based on reasoning and evidence<br>• Select a logical conclusion from a set of choices |
| Make or evaluate an *inductive* conclusion | • Statement, scenario, information in form of graph/chart, or set of examples | • Formulate a hypothesis<br>• Test hypothesis and revise<br>• Formulate a definition or concept based on examples and nonexamples |
| Identify/define a problem | • Scenario or problem description | • Identify the problem that has to be solved<br>• Identify the question that has to be answered |
| Reason with data | • Text, graph, chart, data table, or problem that requires more information or a solution | • Solve the problem and explain reasoning using data |
| Think creatively | • Complex problem/task requiring brainstorming innovative ideas or reorganizing existing ideas or a problem with no currently known solution | • Produce an original text, product, concept, or idea<br>• Organize materials in new ways<br>• Reframe a question/problem in new ways |

### 17.4.8 Use Inferences from Multiple and Balanced Sources of Evidence versus One Sole Source of Evidence

The many teachers with whom distance programs will interact are extremely diverse. They are diverse in terms of language ability, experience, time in the classroom, gender, and educational and professional opportunities (Voltz et al., 2010). They are diverse in their approaches and attitudes toward learning. They are diverse in their likes and dislikes, in their personal strengths and weaknesses, and in their levels of commitment to teaching and learning. Therefore, just as no distance education system can impose a one-size-fits-all instructional approach, no distance education system can impose a one-size-fits-all assessment approach. It is important to make any assessment system as diverse as possible in order to be as fair and sensitive[3] as possible to a variety of learners. "Fairness" does not mean that every teacher-learner receives the same test—although for some purposes, standardized and normative tests may be necessary. Rather, it means that every learner has an equal opportunity to be assessed in the manner that best displays what he or she knows and can do (Voltz et al., 2010; Royal & Guskey, 2015).

To do this, distance programs can use a wider range of context-based, complex tasks that can be used with multiple approaches and solutions, instead of using only assessment items that are short, knowledge-focused, single-answer, and decontextualized (Black & Wiliam, 2018; Heritage, 2010; Hosp, 2010; Moon et al., 2005; Royal & Guskey, 2015; Timperley et al., 2007). They can also differentiate grading—employing self-, peer-, and instructor assessment of the products, processes, and progress of learning, both separately and cumulatively.

One model of using multiple and balanced sources of evidence comes from the National Board of Certification[4] in the United States. Teachers applying for this certification are assessed on 10 measures, including an examination of content knowledge, a comprehensive portfolio of teacher practice and student work, and interview-based methods developed by the National Board for Professional Teaching Standards (National Board for Professional Teaching Standards, 2022).

### 17.4.9 Where Possible and Appropriate, Take Advantage of Technology for Assessment

The past decade has seen breakthroughs in technology-based assessment that measures complex thinking; lowers the cost differential of assessment, because assessment takes less time to score and store; enables quick turnaround of assessment data to the instructor and learners; helps instructors to assess learner performance at a much more granular, detailed level; and allows for more reliable scoring and valid data interpretation (Burns, in press).

Assessment must be part of every mode of distance education delivery. While certain types of distance education have more opportunities to assess learners than other forms (e.g., online learning versus interactive audio instruction), all types of technology combined with assessment theory can identify new and better ways to assess what matters; conduct formative assessment; and involve multiple stakeholders in the formulation, design, administration, and analysis of assessment data (Morris et al., 2021).

### 17.4.10 Provide Language Supports to Teachers Who May Need Them

Before concluding this chapter, it is important to note that in many countries in which this guide will

[3] "Sensitive" here is used in an assessment sense—designing instruments in such a way that they accurately measure what they are supposed to measure.

[4] National Board Certification is an advanced teaching credential in the United States that complements, but does not replace, a U.S. state's teacher license. It is valid for 10 years. National Board Certification is achieved upon successful completion of a voluntary assessment program designed to recognize effective and accomplished teachers who meet high standards based on what teachers should know and be able to do. See http://www.nbpts.org/ for more information.

be read, teachers undoubtedly speak a number of languages other than the official or national language. The importance of providing assessment in a learner's first language has been widely acknowledged as a best practice in assessment. Numerous distance education systems have made reasonable accommodations for non-national language speakers by making test taking more flexible to allow examinees to have time to think and respond to questions in the national language, or by providing dictionaries, plug-ins that provide modifications such as translations and closed captioning, and visual and audio information to learners in both their native language and the language of instruction (e.g., Kannada, English, Bambara, French, Sundanese, Bahasa Indonesia, etc.) (Myung et al., 2020). Better still, of course, is conducting the assessment entirely in the learner's first language (Reid & Kleinhenz, 2015).

## 17.5 Conclusion

Realigning assessment within distance learning programs toward recognized best practices involves a number of approaches that will be new in many systems. These include defining and analyzing instructional quality into discrete measurable indicators that monitor teachers' progress and learning (formative assessment) and evaluating their final performance on the most critical components of teaching (summative assessment).

Quality distance education programs embrace and enact these practices. They recognize that assessment, even when summative, always has a formative component; that is, instructors should always use assessment results to further refine instruction within a distance environment. They use a multitude of measures—performance-based assessment, and traditional and alternative assessments—to assess how teachers are learning, whether they are learning, and what they are learning. They recognize that assessment—of learning, of instruction, or learners' progress, process, and products of learning—is the foundation on which a quality distance program rests.

Citation: Burns, M. (2023). Assessing Distance Learners. In *Distance Education for Teacher Training: Modes, Models and Methods.* (2nd Edition). Washington, DC: Education Development Center.

## References

Archer, E. (2017). The assessment purpose triangle: Balancing the purposes of educational assessment. *Frontiers in Education*. https://doi.org/10.3389/feduc.2017.00041

Audisio, A., Taylor-Perryman, R., Tasker, T., & Steinberg, M. (2022). *Does teacher professional development improve student learning? Evidence from leading educators' teacher fellowship model. (EdWorkingPaper: 22-597).* Annenberg Institute at Brown University: https://doi.org/10.26300/ah2f-z471

Baker, R., Mitrović, A., & Mathews, M. (2010). User modeling, adaptation and personalization: Detecting gaming the system in constraint-based tutors. *Lecture Notes in Computer Science, 6075*, 267–278. doi:DOI: 10.1007/978-3-642-13470-8_25

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Prentice Hall.

Batsell Jr. , W., Perry, J., Hanley, E., & Hosseter, A. (2017). Ecological validity of the testing effect: The use of daily quizzes in introductory psychology. *Teaching of Psychology, 44*(1), 18–23. https://doi.org/10.1177/0098628316677492

Black, P., & Wiliam, D. (2018). Classroom assessment and pedagogy. *Assessment in Education, 25*(3), 1–28. https://doi.org/10.1080/0969594X.2018.1441807

Bloom, B. (1956). *Taxonomy of educational objectives, Handbook: The cognitive domain.* David McKay.

Bloom, B. (1971). Mastery learning. In J. Block (Ed.), *Mastery learning: Theory and practice* (pp. 47–63). Holt, Rinehart and Winston.

Brame, C. (2013). *Writing good multiple choice test questions.* Center for Teaching Vanderbilt University. https://cft.vanderbilt.edu/guides-sub-pages/writing-good-multiple-choice-test-questions

Brame, C., & Biel, R. (2015). Test-enhanced learning: The potential for testing to promote greater learning in undergraduate science courses. *Cell Biology Education—Life Sciences Education*, *14*, 1–12. https://doi.org/10.1187/cbe.14-11-0208

Brookhart, S. (2010). *How to assess higher-order thinking skills in your classroom.* Association of Supervision and Curriculum Development.

Buckley, J., Colosimo, L., Kantar, R., McCall, M., & Snow, E. (2021). Game-based Assessment for Education. *OECD Digital Education Outlook 2021: Pushing the Frontiers with Artificial Intelligence, Blockchain and Robots*. https://doi.org/10.1787/589b283f-en

Burns, M. (2018, August 13). *Five guidelines for developing good online assessments*. eLearning Industry. https://elearningindustry.com/developing-good-online-assessments-guidelines

Burns, M. (2021). *Background paper prepared for the 2023 Global Education Monitoring report, Technology and education: Technology in education.* United Nations Educational, Scientific and Cultural Organization. https://unesdoc.unesco.org/ark:/48223/pf0000378951

Burns, M. (in press). *Barriers and supports for technology integration: Views from teachers. Background chapter prepared for the Global Education Monitoring report: Technology and education.* United Nations Educational, Scientific and Cultural Organization.

Chirumamilla, A., & Sindre, G. (2019). Mitigation of cheating in online exams: Strengths and limitations of biometric authentication in online learning environments. In A. V. Senthil Kumar (Ed.), *Biometric authentication in online learning environments* (pp. 47–68 ). IGI Global. https://doi.org/10.4018/978-1-5225-7724-9.ch003

Commonwealth of Learning & Asian Development Bank (Eds.). (2008). *Quality assurance in open and distance learning: A toolkit.*

Contact North | Contact Nord. (2020, May 12). *Ten Radical ways assessment is changing*. TeachOnline.ca. https://teachonline.ca/ai-resources/ten-radical-ways-assessment-changing

Downing, S. (2006). Selected-response item formats in test development. Handbook of test development, 287, 301. In T. Haladyna, & S. Downing (Eds.), *Handbook of test development.* Educational Testing Service.

Druckman, D., & Bjork, R. (1994). *Learning, remembering, believing: Enhancing human performance.* National Academy Press.

Espinosa, T., Miller, K., Araujo, I., & Mazur, E. (2019). Reducing the gender gap in students' physics self-efficacy in a team-and project-based introductory physics class. *Physical Review Physics Education Research*, *15*(1). doi:10.1103/PhysRevPhysEducRes.15.010132

Gee, J. P., & Shaffer, D. W. (2010). *Looking where the light is bad: Video games and the future of assessment. (Epistemic games group working paper No. 2010-02).* University of Wisconsin-Madison. https://www.semanticscholar.org/paper/Looking-where-the-light-is-bad:-Video-games-and-the-Gee-Shaffer/d0d7c77a88415838206f317c899e1ad7975e89ed

Goetz, T. (2011, July). The feedback loop: How technology has turned an age-old concept into an exciting new strategy for changing human behavior. *Wired*, pp. 126–162.

Guskey, T. (2010, October). Lessons of mastery learning. *Educational Leadership*, *68*(2), 53–57.

Haagsman, M., Scager, K., Boonstra, J., & Koster, M. (2020). Pop-up questions within educational videos: Effects on students' learning. *Journal of Science Education and Technology*, *29*(6), 713–724. https://doi.org/10.1007/s10956-020-09847-3

Heissel, J., Adam, E., Doleac, J., Figlio, D., & Meer, J. (2021, Spring). Testing, stress, and performance: How students respond physiologically to high-stakes testing. *Education Finance and Policy*, *2*, 183–208. https://doi.org/10.1162/edfp_a_00306

Heritage, M. (2010). *Formative Assessment and Next-Generation Assessment Systems: Are We Losing an Opportunity?* Council of Chief State School Officers. https://files.eric.ed.gov/fulltext/ED543063.pdf

Hosp, J. (2010, December). *Linking assessment and instruction: Teacher preparation and professional development. TQ connection issue paper.* National Comprehensive Center for Teacher Quality. https://files.eric.ed.gov/fulltext/ED520827.pdf

Hultberg, P., Calonge, D., & Lee, A. (2018). Promoting long-lasting learning through instructional design. *Journal of the Scholarship of Teaching and Learning*, *18*(3), 26–43. https://doi.org/10.14434/josotl.v18i3.23179

Johnson, E., Andrews-Larson, C., Keene, K., Melhuish, K., Keller, R., & Fortune, N. (2020). Inquiry and gender inequity in the undergraduate mathematics classroom. *Journal for Research in Mathematics Education*, *51*(4), 504–516. https://doi.org/10.5951/jresematheduc-2020-0043

Kulhavy, R., & Stock, W. (1989). Feedback in written instruction: The place of response certitude. *Educational Psychology Review*, *1*(4), 279–308. https://doi.org/10.1007/BF01320096

Lederman, D. (2020, July). *Best way to stop cheating in online courses? 'Teach better.'* Inside Higher Education. https://www.insidehighered.com/digital-learning/article/2020/07/22/technology-best-way-stop-online-cheating-no-experts-say-better

Letseka, M., & Pitsoe, V. (2013). Reflections on assessment in open distance learning (ODL): The case of the University of South Africa (UNISA). *Open Praxis*, *5*(3), 197–206. https://www.learntechlib.org/p/130673/

Maeda, M. (2019). Exam cheating among Cambodian students: When, how, and why it happens. *Compare: A Journal of Comparative and International Education*, 1–19. https://doi.org/10.1080/03057925.2019.1613344

Momsen, J., Long, T., Wyse, S., & Ebert-May, D. (2017, Winter). Just the facts? Introductory undergraduate biology courses focus on low-level cognitive skills. *Cell Biology Education*, *9*(4), 435-440. https://doi.org/10.1187/cbe.10-01-0001

Moon, B., Leach, J., & Stevens, M. (2005). *Designing open and distance learning for teacher education in Sub-Saharan Africa: A toolkit for educators and planners.* World Bank. http://oro.open.ac.uk/8401/1/teacher_education_toolkit_may13.pdf

Morris, E., Farrell, A., & Venetis, E. (2021, January). *A roadmap for for measuring distance learning: A Review of evidence and emerging practices.* United States Agency for International Development. https://www.edu-links.org/sites/default/files/media/file/Measuring%20Impact%20and%20Outcomes_Final_01.20.2021-508%20%281%29.pdf

Myung, J., Gallagher, A., Cottingham, B., Gong, A., Kimner, H., Witte, J., . . . Hough, H. (2020). *Supporting learning in the COVID-19 context: Research to guide distance and blended instruction.* Policy Analysis for California Education (PACE). https://files.eric.ed.gov/fulltext/ED609208.pdf

National Board for Professional Teaching Standards. (2022, August). *National board certification*. https://www.nbpts.org/certification/

Niess, M. (2011). Investigating TPACK: Knowledge growth in teaching with technology. *Journal of Educational Computing Research, 44*(3), 299–317. https://doi.org/10.2190/EC.44.3.c

Pandey, C., & Kapitanoff, S. (2011). The influence of anxiety and quality of interaction on collaborative test performance. *Active Learning in Higher Education, 12*(3), 163–174. https://doi.org/10.1177/1469787411415077

Reid, K., & Kleinhenz, E. (2015). *Supporting teacher development: Literature review.* Australian Council for Educational Research.

Reville, S., Coggins, C., Candon, J., McDermott, K., Churchill, A., & Long, B. (2005). *Reaching capacity: A blueprint for the state role in improving low performing schools and districts.* Rennie Center for Education Research & Policy.

Roediger III, H., & Butler, A. (2011). The critical role of retrieval practice in long-term retention. *Trends in cognitive sciences, 15*(1), 20–27. https://doi.org/10.1016/j.tics.2010.09.003

Rosenshine, B. (1970). Evaluation of classroom instruction. *Review of Educational Research, 40*(2), 279–300. https://doi.org/10.3102/00346543040002279

Royal, K., & Guskey, T. (2015). A case for differentiated grades. *Medical Science Educator, 25*(3), 323–325. doi:DOI: 10.1007/s40670-015-0127-5

Schacter, D., & Szpunar, K. (2015). Enhancing attention and memory during video-recorded lectures. *Scholarship of Teaching and Learning in Psychology, 1*(1), 60–71. https://doi.org/10.1037/stl0000011

See, B. (2022, August 15). Where have we gone wrong in our battle against teacher shortages? *Open Access Government*. https://www.openaccessgovernment.org/where-have-we-gone-wrong-in-our-battle-against-teacher-shortages/140272/

Spencer, S., Logel, C., & Davies, P. (2016). Stereotype threat. *Annual Review of Psychology, 67*, 415–437. https://doi.org/10.1146/annurev-psych-073115-103235

Steele, C. (1999, August). Thin ice: Stereotype threat and Black college students. *The Atlantic*. https://www.theatlantic.com/magazine/archive/1999/08/thin-ice-stereotype-threat-and-black-college-students/304663/

Tempelaar, D., Rienties, B., & Giesbers, B. (2015). Stability and sensitivity of learning analytics based prediction models. *Proceedings of 7th International conference on Computer Supported Education* (pp. 156-166). CSEDU.

The New Teacher Project. (2011, February). *Rating a teacher observation tool: Five ways to ensure classroom observations are focused and rigorous.* The New Teacher Project. https://tntp.org/assets/documents/TNTP_RatingATeacherObservationTool_Feb2011.pdf

Timmis, S., Broadfoot, P., Sutherland, R., & Oldfield, A. (2015). Rethinking assessment in a digital age: Opportunities, challenges and risks. *British Educational Research Journal Early View.* doi:10.1002/berj.3215

Timperley, H., Wilson, A., Barrar, H., & Fung, I. (2007). *Teacher professional learning and development: best evidence synthesis iteration.* New Zealand Ministry of Education. http://www.educationcounts.govt.nz/publications/series/2515/15341

Tropman, E. (2014). In defense of reading quizzes. *International Journal of Teaching and Learning in Higher Education, 26*(1), 140–146. https://files.eric.ed.gov/fulltext/EJ1043037.pdf

Voltz, D., Sims, M., & Nelson, B. (2010). *Connecting teachers, students and standards: Strategies for success in diverse and inclusive classrooms.* Association for Supervision and Curriculum Development.

Warschauer, M. (2009). Learning to write in the laptop classroom. *Writing and Pedagogy, 1*(1), 101–112. doi:doi: 10.1558/wap.v1i1.101.

Wiley Publishing. (2020, May). *Academic integrity in the age of online learning.* John Wiley & Sons (Wiley). https://www.wiley.com/en-us/network/education/instructors/teaching-strategies/academic-integrity-in-the-age-of-online-learning-3

Wyatt-Smith, C., Lingard, B., & Heck, E. (2019). *Digital learning assessments and big data: Implications for teacher professionalism.* UNESCO education research and foresight-Working papers. https://unesdoc.unesco.org/ark:/48223/pf0000370940

Section II. Chapter 18

# EVALUATING DISTANCE EDUCATION PROGRAMS

## Table of Contents

**Best Practice:** Successful distance education programs are characterized by continual formative evaluation and rigorous summative evaluation.

## 18.1 Overview

As Chapter 7 of this guide has discussed, and Section 1 of the guide has shown, distance programs have increasingly embraced the importance of evaluation (Morris et al., 2021). Well-designed and implemented evaluations inform distance education policymakers, planners, funders, and implementers about the value and merit of distance programs.

Evaluating distance education programs is not without its challenges and evaluation has traditionally been one of the most overlooked areas in distance education. Outcomes may not be defined, the purpose may not be determined, and questions about who benefits (teacher-learner, school, or student) may not be developed. The program may have been designed with unclear goals or objectives against which it cannot be measured, or the evaluation may have been designed after the program began. The capacity and resources to conduct an evaluation may be limited or nonexistent—and worse, high attrition rates may render any evaluation unreliable[1] or invalid.[2] Combine these issues within the nontraditional setting of distance education, and the design and implementation of rigorous and meaningful evaluations are often severely handicapped.

Evaluations of any distance education program also confront a number of methodological problems, including the need for measures other than standardized achievement tests; disparities among learners in opportunities to learn; and differences in starting points and program implementation. Many distance education programs that receive funding via external aid agencies may have to concern themselves only with monitoring and evaluation, which traditionally looks at inputs (number of teachers trained) versus outcomes (number of teachers who implement a strategy) or impact (how learner achievement has changed as a result of teachers' professional development). Left unanswered is the most salient questions about the worth and value of a distance course of study.

Yet, formidable although they may be, the drawbacks of evaluations are far outweighed by their benefits. To accrue their full worth, evaluations should not be simply a valedictory exercise—initiated just as a distance program is about to conclude. Rather they should be woven through program design and implementation and undertaken by skilled evaluators working closely and collaboratively with a distance education program over the course of the program's existence. This way, every distance program, regardless of size, characteristics, or purpose, will have "credible, useful evidence-based information" so problems can be fixed and the value and worth of the program determined (United Nations Evaluation Group, as cited in World Food Program Office of Evaluation, 2021, p.2).

[1] An evaluation instrument is considered reliable if the instrument can be used repeatedly with different groups of similar subjects and yield consistent results.
[2] Validity refers to the accuracy of an assessment—whether or not it measures what it is supposed to measure.

Evaluation is a complex and comprehensive topic that cannot be adequately addressed in a single chapter. Thus, this chapter provides a general overview of evaluations within a distance education context. It outlines decision points, steps, and guidelines that distance programs may employ in consultation with evaluators to determine the worth and value of their distance education offerings.

## 18.2 What is Evaluation?

The United Nations Evaluation Group (2016) defines evaluation as a process which is:

> *conducted as systematically and impartially as possible... (analyzing) both expected and unexpected results by examining the results chain, processes, contextual factors, and causality using appropriate criteria (and) ... (It provides) credible, useful evidence-based information that enables the timely incorporation of its findings, recommendations, and lessons into the decision-making process of organizations and stakeholders.* (Cited by World Food Program Office of Evaluation, 2021, p. 2)

Evaluation is typically done at the request of a client—funders, distance education programs, or policymakers—and in "collaboration with various stakeholders" who may be invested in distinguishing between what works and what doesn't; assuring accountability; or improving a particular intervention, event, program, or activity (Bonney et al., 2011, p. 14; Rossi et al., 2004, p. 14).

As important as defining what evaluation *is*, is defining what it *is not*. Evaluation, although overlapping and sometimes conflated with *assessment*, *research*, and *quality assurance*, is distinct from all three of these activities.

### 18.2.1 Evaluation versus Assessment

Evaluation shares similarities with assessment, discussed in Chapter 17. Like assessment, it has multiple models, and as with assessment, evaluations can be front-end (sometimes diagnostic), formative, and summative (Rossi et al., 2004). However, while evaluations ascertain whether a set of standards have been met and render value judgments about the work or value of a *program*, assessment is a process for gathering information that is used to make decisions about *people*—it provides feedback on learner performance and ways to enhance that performance in the future (Brookhart & Nitko, 2011). Thus, within this guide, assessment focuses on *people* (specifically teacher-learners) while evaluation focuses on *programs*.

### 18.2.2 Evaluation versus Research

Evaluation is also similar to, but distinct from, *research*. Both evaluations and research have different foci and purposes, and there are lively debates as to how to define each. For the purposes of this guide, evaluations are focused on judging and improving the merit, worth, value, or effectiveness of a particular program, while educational research studies a particular phenomenon, often within an academic discipline or a specific theoretical framework. Unlike evaluations, which are client-focused, undertaken for a specific purpose and often are not published, research has no particular client and is undertaken for purposes of knowledge generation, with the ultimate goal of publication in a peer-reviewed or other respected education journal (Bonney et al., 2011, p. 15).

### 18.2.3 Evaluation versus Quality Assurance

Finally, evaluation is a major part of *quality assurance*, and both program evaluation and quality assurance are part of continuous improvement cycles. Yet, again, these two terms are distinct. If evaluation is focused on programs and assessment on people, quality assurance is focused on processes and outcomes. And while evaluation is about discernment and judgment, quality assurance is about elimination of defects and alignment to standard). Evaluation is one—extremely critical—component of a quality assurance system designed to identify, analyze, and eliminate defects in

**Figure 18.1**
**The Three Types of Evaluation (Bonney et al., 2011, pp. 16, 26, 49)**

| Type | When It Generally Occurs | Focus | Purpose |
|---|---|---|---|
| Front-End | Before a distance education course or program begins | Design: Plan and shape the content and instruction that distance learners receive | • Audience research: For example, current teacher practice and teacher needs<br>• Market research: For example, current distance learning opportunities<br>• Contextual information: National educational priorities and socioeconomic conditions of teacher-learners |
| Formative | Throughout the life of the distance education course or program | Improvement: Identify areas of improvement | • Gather data about a project's strengths and weaknesses for purposes of revision and improvement<br>• Monitor a project on an ongoing basis through regular data collection<br>• Describe how a project functions<br>• Provide recommendations to improve project functionality<br>• Clarify program purpose or theory |
| Summative | At the end of a distance education course or at certain intervals in a distance program (e.g., end of the year or semester) | Judgment: Make decisions about continuing, replicating, or terminating a program | • Determine a program's overall effectiveness and value<br>• Gauge whether targeted outcomes have been achieved<br>• Summarize learning from the evaluation and any unintended effects that were documented<br>• Identify project strengths and weaknesses<br>• Determine overall value or worth of a project<br>• Determine cause-and-effect relationships between an intervention and outcomes |

processes and outcomes (Donabedian, 1988, as cited in Leahy et al., 2009, p. 70).

## 18.3 Why Evaluate?

Continual monitoring and rigorous, well-designed and implemented evaluations are critical to the success of any distance education program. They inform distance education policymakers, planners, funders, and instructors about the value and merit of distance programs and indicate what assumptions, inputs, and activities should change and how change should be accomplished. As discussed in the previous chapter, evaluation has teacher licensing implications; as discussed in the next chapter, it also has accreditation implications.

Thus, evaluation processes and results can improve programs and determine which ones should be maintained, changed, or closed. They provide insights into a particular program, generate knowledge, and help educators generalize or predict future behaviors or outcomes in similar situations in order to scale up innovations (Patton, 2008).

Simply put, without well-designed and rigorous evaluations, we cannot make claims about the effectiveness or ineffectiveness of an intervention. Without evaluation, we have no idea whether a distance education program really works. And if a program does fail, a good evaluation can help planners and designers understand and learn from the failure.

## 18.4 Types of Evaluation

Evaluations generally fall into one of three types: front-end (sometimes referred to as diagnostic), formative, or summative.

A well-known simile for understanding the above types of evaluation is to compare evaluation to soup. When the cook asks the customer what they want to eat (something hot and filling—soup!), this is *front-end* evaluation. As the cook tastes the soup in its preparation, this is *formative* evaluation. When the customer makes a pronouncement on the soup—delicious or needing more salt—this is *summative* evaluation (Scriven, 1991, p. 63).

All three of these types of evaluation should be part of any distance education program. Moon et al. (2005) suggest early and ongoing formative evaluation during course development and during the pilot phase to ensure that courses are effective and achieving their stated objectives. This process might include the following:

- A review of course prototypes by content experts, distance education experts, and instructional design experts
- A pilot study tracking learner usage, along with instructor and learner surveys and focus groups
- Interviews and focus groups with learners (pre-service teacher candidates and in-service teachers) on questions of pace, workload, responsiveness of instructor/facilitator/tutor, levels and types of support, student learning, learner satisfaction, and ease of technology use
- A final pilot evaluation report (Moon et al., 2005)

All of this information should then be used to inform future planning, make midcourse corrections and revisions, and curtail any projects that are not succeeding before more time, energy, and funding are devoted to them (Gaible & Burns, 2007). The distinct types of evaluations—front-end (diagnostic), formative, and summative—can accommodate distinctive designs depending on the questions being asked and the different measures and outcomes used to provide information to answer these questions (see Figure 18.5).

## 18.5 Evaluating Distance Education Programs: A Non-systematic Approach

Many distance education programs may not be ready to embark on a systematic or full-scale evaluation, but they still can gather information from teacher-learners. They can use the course survey features embedded in a learning management system (LMS), design their own surveys or interview questions for teachers, or adapt previously developed teacher professional development evaluation tools for an online or distance-based environment. This section explores these three potential options for collecting basic data from teachers for formative purposes.

### 18.5.1 Course Evaluations

Course evaluations can be designed within the online course platform itself as part of the LMS or as a webinar or online seminar, or they can be sent via a mobile device. Course evaluations provide useful summative information as well as formative information on how to improve the course offering. Figure 18.2 provides an overview of a potential

**Figure 18.2**
**Questionnaire/Survey**

| Purpose |
|---|
| Assess teachers' perceptions of the distance program—its benefits, weaknesses, changes on their practice, and suggested improvements |
| **Appropriateness** |
| • This is a predetermined list of questions that can consist of structured or unstructured responses.<br>• The format can be print or digital.<br>• It can be mailed or dropped off to teachers and collected for completion. |
| **Strengths** |
| • A large sample size can be accommodated.<br>• It works well if the sample is geographically dispersed.<br>• The sample is useful if it is certain to be completed and returned.<br>• It allows for easy data analysis. |
| **Weaknesses** |
| • It is more difficult to differentiate among levels of response (e.g., on scale from 1–5, is there an incremental and discernible difference between 3 and 4?).<br>• Surveys generally have a low return rate.<br>• If done on paper, there can be lengthy delays in completion and the return of results.<br>• The information yielded is more superficial and narrower.<br>• Surveys suffer from "desirability bias." Respondents often select the response they believe the surveyor wants to see. |
| **Cost Considerations** |
| • Comparatively low: It can be conducted online via mobile phones (e.g., text) or interactive voice response (IVR).<br>• It may involve printing, mailing (or personal delivery), and collection.<br>• It will involve data entry, cleaning (spreadsheet), and data analysis. |

course survey. Note that the "Purpose" column provides an example, as opposed to a recommendation.[3] The advantage of designing a survey in an LMS[4] is that questions can be stored in a Question Bank or Item Bank and then reused and repurposed as needed for future courses.

### 18.5.2 Adapting In-Person Professional Development Evaluation Tools

Online and blended distance programs, interactive audio instruction (IAI), print-based, video-based, and mobile learning programs may, and often do, adapt, or use in their entirety existing evaluation frameworks created for in-person environments. The following three such frameworks are discussed: Kirkpatrick, Guskey, and Scriven.

#### Kirkpatrick's Four Levels of Training Evaluation

Internationally, one of the best-known frameworks for evaluating professional development has been Kirkpatrick's model, developed in 1959 to evaluate trainings for Heifer International. This model was updated continuously until 1993. It comprises four levels, each of which builds stepwise on the previous level:

- Level I evaluates teachers' *reactions* to the professional development.
- Level II evaluates teachers' *learning.*
- Level III evaluates teachers' *behavior.*
- Level IV evaluates professional development *results* in the classroom (Mindtools, n.d.).

Not surprisingly for a framework that is so long-lived, the four-level model is not without criticism. There are suggestions that it be implemented in reverse order, and there are questions about its utility in an age of so much informal learning (Mindtools, n.d.). Despite the critiques, the framework is still popular.

#### Guskey's Five Levels of Evaluating Professional Development

A similar, but more comprehensive, professional development evaluation framework is that of Thomas Guskey (2000, 2016), whose five-level framework for evaluating professional development is outlined in Figure 18.3 (next page). These levels range from the lowest level of evaluation—assessing teachers' reactions to the professional development—to the highest—determining whether the professional development for teachers had any impact on *student* learning.

These five levels reflect the complexity of evaluating professional development, but they also serve as a good model for evaluating professional development—whether in-person, blended or via distance. As Figure 18.3 implies, multiple types of evaluations can be created to measure different outcomes while many levels of the evaluation may also use many of the same instruments (e.g., interviews and teacher portfolios).

#### Scriven's Evaluation of Training

A third model is Scriven's Evaluation of Training (2009), a training or professional development evaluation checklist that can be used for formative and summative evaluations, monitoring professional development, and even conducting meta-evaluations. As will be seen, it combines elements of Kirkpatrick's four levels and Guskey's five levels of evaluating professional development. The checklist consists of 11 questions, listed in Figure 18.4.

Programs have at least two options for using these data. They can use the information they've gathered to inform future iterations of an online course, or they can then hire an external evaluator to explore larger questions and issues that emerge as part of a more systematic evaluation (L. Goodyear, personal communication, September 16, 2022). This more systematic approach is discussed after Figure 18.3.

[3] The University of Wisconsin offers comprehensive information on designing end-of-course surveys, including questions, considerations, and uses of the survey. See https://assessment.provost.wisc.edu/best-practices-and-sample-questions-for-course-evaluation-surveys/

[4] Another resource for survey design can be found at Tools4Dev at https://tinyurl.com/4xad58f4

**Figure 18.3**
**Five Levels of Evaluating Professional Development (Guskey, 2000, 2016)**

| Evaluation Level | What Questions Are Addressed? | How Will Information Be Gathered? | What Is Measured or Assessed? | How Can This Information Be Used? |
|---|---|---|---|---|
| Level 1: Teachers' reactions | • Did teachers like it?<br>• Was their time well spent?<br>• Did the materials make sense?<br>• Was the instructor knowledgeable and helpful? | • Questionnaires administered at the end of the session | • Initial satisfaction with the experience | • To improve program design and delivery |
| Level 2: Teachers' learning | • Did teacher-learners acquire the intended knowledge and skills? | • Paper-based/digital instruments<br>• Simulations<br>• Demonstrations<br>• Participant reflection<br>• Participant portfolios | • New knowledge and skills of teacher-learners | • To improve program content, format, and organization |
| Level 3: Organization support and change | • What was the impact on the organization?<br>• Did it affect organizational climate and procedures?<br>• Was implementation advocated, facilitated, and supported?<br>• Were problems addressed quickly and efficiently? | • District and school records<br>• Minutes from follow-up meetings<br>• Questionnaires<br>• Structured interviews with participants or administrators<br>• Participant portfolios | • Organization's advocacy, support, accommodation, facilitation, and recognition | • To document and improve organizational support<br>• To inform future change efforts |
| Level 4: Teacher-learners' use of new knowledge and skills | • Did teachers effectively apply new knowledge and skills? | • Questionnaires<br>• Structured interviews with teachers and administrators<br>• Teacher portfolios<br>• Teacher reflections<br>• Direct or videotaped classroom observations | • Degree and quality of implementation | • To document and improve implementation of program content |

| Evaluation Level | What Questions Are Addressed? | How Will Information Be Gathered? | What Is Measured or Assessed? | How Can This Information Be Used? |
|---|---|---|---|---|
| Level 5: Student learning outcomes | • What was the impact on students?<br>• Did it affect student performance/ achievement?<br>• Did it influence students' emotional/ physical well-being?<br>• Are students more confident as learners?<br>• Is attendance increasing? | • Student grades<br>• School records<br>• Questionnaires<br>• Structured interviews with students, teachers, administrators, and parents<br>• Teacher portfolios | • Student learning outcomes: cognitive, affective, conative, and psychomotor | • To focus and improve all aspects of program design, implementation, and follow-up<br>• To demonstrate overall impact of professional development |

**Figure 18.4**
**Evaluation of Training Checklist (Scriven, 2009)**

| No. | Topic | Question |
|---|---|---|
| 1. | **Need** | • Is this professional development the best way to address this particular need? |
| 2. | **Design** | • Does the design of the professional development target the particular need defined above?<br>• Does it target teachers' background and current knowledge, skills, attitudes, and values?<br>• Does it consider existing resources? |
| 3. | **Delivery** | • Was the professional development announced, attended, supported, and presented as proposed? |
| 4. | **Reaction** | • Was the professional development relevant, comprehensible, and comprehensive? |
| 5. | **Learning** | • Did teachers master intended content, acquire intended value, or modify their attitudes as a result of the professional development? |
| 6. | **Retention** | • Did teachers retain the learning for appropriate intervals? |
| 7. | **Application** | • Did teachers use and appropriately apply what they learned in the professional development? |
| 8. | **Extension** | • Did teachers use what they learned at other times, in other sites, or with other subjects? |

| No. | Topic | Question |
|---|---|---|
| 9. | **Value** | • What was the value of the professional development for teachers? |
| 10. | **Alternatives** | • What alternative approaches could be used to meet the same needs? |
| 11. | **Return on Investment** | • What is the value of the professional development for students, the school, the district, the region, and the educational environment? |

## 18.6 Evaluating Distance Programs: A Systematic Approach

For many distance education programs, the information gathered from either a design-it-yourself survey or the three teacher professional development evaluation tools discussed in the above section may suffice, particularly for a formative evaluation where the purpose is to get an idea of teachers' reactions to a distance course or get a general idea of teacher enactment of a strategy, insight, or information.

But for distance programs that want deeper and broader evidence for purposes of program improvement, scaling their intervention, or determining impact, then a more systematic approach, undertaken by a professional evaluator or evaluation team, is necessary. The remainder of this chapter lays out steps and guidelines for this approach. While distance educators need not immerse themselves in the weeds of methodologies, measures, and indicators, it is helpful to understand the broad contours of the evaluation process since they may work closely and consult with evaluators.

This last suggestion emerges from two motivations. First, while evaluation and research are distinct, many evaluators publish evaluations as research. At that point, it is often *they*, not the distance program designers, instructors, and learners, who become associated with the program's success.[5] Second, including the perspectives, expertise, and experiences of distance education practitioners and teacher-learners suffuses the findings with a depth and texture that may be absent from a purely external process, potentially resulting in more compelling, coherent explanatory narratives (Burns, 2020).

### 18.6.1 Initial Decision Points

Distance education programs embarking on a more systematic evaluation will confront four immediate "decision points" (Bonney et al., 2011, p. 25):

1. What type of evaluation?
2. An internal or external evaluator?
3. An independent contractor or an evaluation firm?
4. A local or out-of-area evaluator?

The type of evaluation required will be determined by the questions the program wants answered and the evaluation design it uses to answer those questions. For decision points 2–4, decisions will be determined by considering tradeoffs: impartiality versus in-depth knowledge of a program versus perceived bias; project requirements versus budget constraints; knowledge of the local context and cultural competence versus knowledge of the global evaluation field and professional credibility (Bonney et al., p. 26). For some distance programs, the answers to decision points 2–4 may be one, another, or both (i.e., an internal *and* an external evaluator).

Once these decisions are made, evaluators, in consultation with distance education programs, can embark on the steps outlined in Figure 18.5.

[5] Given publication bias, reflected in this document, it is typically successes rather than failures that are published.

**Figure 18.5**
**Evaluation Steps (Led by Evaluator in Consultation with Distance Education Staff) (L. Goodyear, personal communication, September 16, 2022)**

| Steps | Think About |
|---|---|
| **Determine the purpose of the evaluation** | • What do funders want to know?<br>• What does this distance program want to know?<br>• How will this information be used (e.g., program improvement, determining whether a distance program should continue or be shut down)?<br>• Who will use this information and for what purpose? Not who is interested in the findings, but who will actually use them (Rossi et al., 2004, p. 91)?<br>• What will this audience want to know exactly (Rossi et al., 2004, p. 91)? Once evaluation questions have been determined, they can be ranked in order of importance.<br>• What information is required to answer these questions (Rossi et al., 2004, p. 91)? |
| **Decide on an appropriate evaluation approach** | Options might include the following:<br>• **Utilization-focused evaluation.** This evaluation approach has a beneficiary or an audience to whom it provides information that is useful and usable, involving members of this audience in the planning and performance measurement of the evaluation and granting them both the responsibility and the authority to make or oversee changes in the distance learning program based on the evaluation's findings (Patton, 2008).<br>• **Theory-driven evaluation.** This evaluation approach focuses on the contextual or holistic assessment of a program based on the conceptual framework of program theory (SAGE, n.d.).<br>• **Developmental evaluation.** This evaluation approach supports the use of evaluation tools, empirical data, and critical thinking in frequent cycles, working in close collaboration with program actors in a process of adaptive learning (United States Agency for International Development, n.d.).<br>• **Culturally responsive evaluation.** This evaluation approach places culture and the community of focus at the center of the evaluation, helps to support community empowerment, and has a goal of social justice (SAGE, n.d.). |
| **Decide on and develop the evaluation questions that will guide the inquiry** | Examples of potential questions include:<br>• What are teachers' perceptions of their greatest needs?<br>• Did teachers participate in blended courses as envisioned? Why or why not?<br>• Is there empirical evidence that teachers improved instruction in X? |

<table>
<tr><th>Steps</th><th>Think About</th></tr>
<tr><td>Based on the evaluation questions, determine the need for benchmarks or indicators</td><td>Evaluations often will develop measures, metrics, benchmarks, or indicators to be used to ground the inquiry.<br><br>An indicator is a piece of information that communicates a certain state, trend, or progress to an audience. It defines the data to be collected to measure progress, so that the actual results achieved can be compared with the originally designed results. Core indicators are context-specific ways to understand inputs and outcomes of a program or project that we may or may not be able to observe directly, such as the following:<ul><li>Input indicators: For example, the type of ICT equipment and/or software and/or organizational design features of a distance education program</li><li>Outcome indicators: For example, student and teacher effects (affective, cognitive, and behavioral)</li><li>National educational and socioeconomic indicators: For example, enrollment rates, literacy, and gender equity</li><li>Cost indicators: For example, fixed and recurrent costs (Kozma & Wagner, 2006).</li></ul>Criteria are standards by which a distance program may be evaluated. Benchmarks serve as references against which an intervention may be compared or assessed. Examples of criteria or benchmarks may include the following:<ul><li>Reach: Access to technology (i.e., devices, software, infrastructure, programming, and content)</li><li>Engagement: The extent to which users participate as intended in the programming, including participants' views of the learning experience</li><li>Outcomes: Measured changes in learning and behavior (Morris et al., 2021)</li></ul></td></tr>
<tr><td>Develop a design that will answer these questions</td><td>There are numerous evaluation designs. Three are often used in education:<ol><li>Case study design: An in-depth descriptive analyses of a particular person, set of persons, or program.<ul><li>Targets a small set of learners who have performed at various levels as a result of the distance learning program and examines the factors that affected their rates of success (Bamberger & Mabry, 2019; Kratochwill et al., 2010)</li><li>Pros: Particularly appropriate for generating information in applied fields. It generates rich "stories" of the characteristics, enabling factors, and interventions that contribute to change.</li><li>Cons: Case study findings can't be generalized beyond that case study. If not done in depth or impartially, they become little more than public relations.</li></ul></li></ol></td></tr>
</table>

| Steps | Think About |
|---|---|
| **Develop a design that will answer these questions** *(continued)* | **2. Randomized controlled trial (RCT):** Randomly assigns teachers, for example, to a treatment group who participates in the distance course and to a control group that does not.<br>◦ **Pro:** They can compare or contrast these groups, potentially answering the question, *Did the activities implemented lead to the outcomes documented and with what certainty?* (L. Goodyear, personal communication, September 16, 2022).<br>◦ **Cons:** Time, expense, and issues with external validity, and also many questions cannot be answered with an RCT. They often are restricted by how many participants researchers can manage or how long participants can be expected to operate in a controlled condition. They are particularly difficult for new educational technologies or products that are rolled out so quickly and change so rapidly, because outcomes may take a long time to appear. They emphasize mean effects and de-emphasize contextual variables, yet context matters in introducing modern technologies. With "so many variables at play, it is difficult to determine whether the findings are replicable" (Van Nostrand et al., 2022, p. 4).<br>**3. Pre-test and post-test group designs:** Pre-distance course and post-distance course assessments on the same group of learners. The baseline score serves as the comparison group (or counterfactual).<br>◦ **Pros:** The advantage of such a design is that it works well in isolated areas where there's no risk of contamination, and it can provide an approximate estimate of project impacts (Bamberger & Mabry, 2019, p. 225).<br>◦ **Cons:** No control or comparison group, so no way of judging whether the process of pre-testing actually influenced the results. Does not measure the exact magnitude of the impact of an intervention or changes over time (Bamberger & Mabry, 2019, p. 225). |
| **Decide on (1) the appropriate methods to collect data and (2) the kind of data required to answer the above questions** | Questions to consider:<br>• Who is the intended audience and what specific information do you hope to get from its members?<br>• What method of data collection is best suited for obtaining the information that you need from this audience?<br>• When will the information be collected and by whom? (Bonney et al., 2011, p. 53.) |
| **Develop, pilot, and revise data collection instruments** | • This step can include surveys, focus group protocols, or observation tools.<br>• Pay attention to wording and language of data collection tools.<br>• Ensure reliability through test-retesting and other measures.<br>• Pilot with a small group and revise accordingly.<br>• Ensure that directions for use are clear and easy to follow. |

| Steps | Think About |
|---|---|
| **Collect data** | • Train data collectors in appropriate data collection methods: for example, how to conduct classroom observations, where to sit, length of observation, how to accurately complete forms, and other data-collection related activities.<br>• Develop and implement data collection protocols for standardization, for example, the scripts for interviews and focus group protocols that discuss the purpose of data collection, how the collection of personal data will be limited, and how data will be stored, as well as asking for verbal assent and promising confidentiality. (See information on IRB in the next section.)<br>• Make data collection easy on the audience: Be sure to use brief, clear questions; short surveys; and simple vocabulary.<br>• Allow sufficient time for all data collection.<br>• Avoid leading questions. |
| **Analyze the data collected** | • Data analysis can take many different forms and can rely on different methodologies. It may be qualitative data, that is, data derived from interviews or focus groups; it may be quantitative, gathered from surveys or a high-inference (Likert scale) classroom observation; or it may be a mix of qualitative and quantitative (Bonney et al., 2011, p. 53).<br>• Evaluators will analyze and interpret the data in light of the evaluation questions and the outcomes (anticipated and unintended) and will make larger sense of the data (Bonney et al., 2011, p. 53). |
| **Write up findings** | • Pay attention to writing: Present clear, concise findings and avoid whitewashing and obfuscations; be open about failures and what can be learned from them; and unpack methodologies, explaining them in layperson terms with examples and analogies.<br>• Consumers of the evaluation have to be able to understand the strengths and limitations of the methodologies employed. Above all, the evaluation should tell a compelling story (Burns, 2020).<br>• Include and pay special attention to the executive summary, since it may be the only part of the evaluation that funders have time to read (Bonney et al., 2011). |
| **Disseminate findings** | • If evaluations are published, ensure they can be found on open access platforms and distributed to the donors and implementers who funded and did the actual work (Burns, 2020).<br>• Evaluation budgets may have to include money for publishing the most salient findings in straightforward, digestible language accompanied by a clear explanation of methods, intuitively presented data, and usable evidence (e.g., visuals, graphics, data dashboards, explanatory briefs) (Burns, 2020). |

This should be part of an overall evaluation plan the evaluator develops in consultation with distance providers.

## 18.7 Technology and Evaluation

Technology can play an integral role in every step of the evaluation process outlined above, and distance courses undertaking an evaluation will want to consider the types of technology tools required as part of the evaluation process.

Technology can allow for group consensus and decision-making through polling software and flow charts. It can enable "multi-modal" data collection, expanding not simply *what* types of data are collected but *how* they are collected (via distance or in-person) and *who* participates in the process (Morris et al., 2021, p. 32). Technology can generate data—for instance, LMSs create metrics, such as course completion rates, grades, or the amount of time spent on a reading or activity, to provide information on engagement and learner progress. Over time and with enough learners, this information can coalesce into large data sets that provide programs with the power to evaluate every aspect of their online courses' quality and effectiveness and to adjust accordingly. Commercial tools such as *CourseEval HQ* can serve as a vehicle for evaluations as well as aggregating, analyzing, and reporting data. For television and radio broadcasts, evaluators can access program viewing data, and for print-based distance learning, they can find the number of learning packets delivered, whether they were delivered via the Internet or mobile phones, or the number of downloads of a teaching guide or video.

Technology may be most helpful in terms of data capture, storage, and analysis. In the case of survey design, evaluators may use the survey tools within an LMS or specific survey tools such as *SurveyMonkey* or *Qualtrics*. To access the experiences and views of learners with low literacy abilities, or who have vision or hearing loss, evaluators can use other technology tools, such as interactive voice response, phone calls, screen readers, computer-assisted telephone interviews, and SMS or text messages (Morris et al., 2021, p. 32). For example, Worldreader uses photo messages sent through a text message or *WhatsApp* to measure whether learners participated as intended in their programs (Morris et al., 2021, p. 15). These data can be analyzed in applications such as *Excel* software, the open-source *R*, or *SPSS Statistics*.

Focus groups and observations can be recorded via webinar applications such as *Zoom*, voice-to-text applications, or audio tools, or they can be conducted via *WhatsApp*. Although limited by the screen's field of vision, classroom observations can be conducted via *Zoom* or *Webex* (although much more efficiently via *Swivl* cameras), and teacher practices can be captured via digital images and then annotated with tools such as *ThingLink*.

Qualitative research tools such as *Dedoose* and *NVivo* can allow evaluators to code images, audio, and video recordings as well as text-based interviews, and then analyze these data. The coding schemes that drive this data analysis often can be developed in a word processor, spreadsheet, or offline. If an evaluation company has a spatial data analyst, they can use a geographic information system (GIS)—a database application with mapping capabilities—to spatially analyze data and create information-rich evaluation data. For example, they can create point data to show the schools where teachers have participated in distance trainings or, as in the case of Farm Radio international, polygon data that maps the contours of coverage zones for "Her Farm Radio" broadcasts in Ethiopia, Malawi, Tanzania, and Uganda (Morris et al., 2021, p. 32; see also Farm Radio International, 2017).

Finally, for the purposes of data reporting, evaluators can use Web-based data visualization[6] applications and data dashboards that allow evaluators to present quantitative evaluation findings in an attractive and intuitive format. These range from free and open-source tools such as *Kobo Toolbox*, *BatchGeo*, and *Tableau Public* to fee-based *Gapminder* to Microsoft's *Power BI*, part of the Microsoft Power Platform.

## 18.8 Final Evaluation Considerations

Evaluations are complex and time-consuming, particularly in large-scale government or donor-funded distance programs. When done well, openly, thoroughly, in partnership between evaluators and the distance provider, and without political pressure, evaluations offer numerous benefits to distance program designers, instructors, teacher-learners, and ultimately to students. This section offers some final advice.

### 18.8.1 Ensure Stakeholder Agreement

As the reader has probably surmised from the various chapters of this guide, distance education programs have multiple stakeholders—ministries of education, district, or regional education offices, institutional or organizational leaders where courses are housed, program managers, funders, course designers, course instructors, teacher-learners, course coaches, students, community members, parents, taxpayers (in many cases), or educational technology company representatives. Like the proverbial blind man with the elephant, these stakeholders may hold one particular view and have one dominant priority regarding the distance program and the purpose and scope of an evaluation. For instance, course designers may be most interested in improvement-oriented formative evaluation, while funders may prioritize summative or accountability-focused evaluations (Bonney et al., 2011, p. 15).

**Figure 18.6**
**Evaluation Standards**

This guide has repeatedly emphasized the importance of standards in ensuring a certain degree of quality in all distance education-related processes. The same holds true for evaluations. There are numerous evaluation standards from which to draw. For example, the Joint Committee on Standards for Educational Evaluations outlines a set of evaluation standards that include the following:

- *Utility:* To ensure that stakeholders find evaluation processes and products valuable in meeting their needs
- *Feasibility:* To increase evaluation effectiveness and efficiency
- *Propriety*: To support what is proper, fair, legal, right, and just in evaluations
- *Accuracy:* To enhance the dependability and truthfulness of evaluation representations, propositions, and findings, especially those that support interpretations and judgments about quality
- *Accountability*: To encourage adequate documentation of evaluations and a meta-evaluative perspective focused on improvement and accountability for evaluation processes and products (Yarbrough et al., 2011)

The American Evaluation Association offers a free rubric of evaluator competencies, along with an explanatory guide (Minnesota Evaluation Studies Institute, 2018). Finally, the United Nations Evaluation Group (2016) norms and standards for evaluation, available in multiple languages.

Therefore, stakeholders and evaluators must have open conversations to agree on the goals and intended purposes for a project's evaluation. Then the evaluator will be able to determine the best approaches and methods to conduct one or more studies. Sometimes data collected from

[6] For some examples of data visualization in action, see https://towardsdatascience.com/the-10-best-data-visualizations-of-2022-3e49d7ccb832

participants can be used for multiple evaluation purposes (Bonney et al., 2011, p. 15).

### 18.8.2 Evaluate Before Scaling

Many government-financed distance programs feel pressure to scale, if for no other reason than to ensure equity in professional development. Yet they often fail to evaluate their models, practices, or innovations to see if they are worth continuing or scaling (Duflo, 2004). Thus, for distance education programs that wish to scale, evaluations, particularly RCTs, are extremely valuable: They determine impact, and their information can be shared with others. The benefits of knowing which programs work and which do not—and which elements of a program work, for whom, and under what conditions—are important public goods "in the sense that they can offer reliable guidance to schools, universities, teacher education programs, ministries of education, funders, and nonprofits in their ongoing search for effective programs" (Duflo, 2004, p. 342).

### 18.8.3 Follow Government and Funder Guidelines

Summative assessment approaches must follow established best practices in evaluation. For example, Morris et al. (2021) remind international education implementers using United States Government funds to follow the United States Agency for International Development's Collaborating, Learning, and Adapting guidelines and guidance "whether assessments are conducted in person or remotely" (Morris et al., 2021, p. 5; see also United States Agency for International Development, n.d.).

One area that deserves particular mention here is institutional review board (IRB) approval for working with a "human subject," which is the person from whom an evaluator obtains data. The purpose of IRB guidelines is to protect the safety, rights, and welfare of individuals participating as subjects in research and evaluation. This is particularly germane for evaluations that might be obtaining data from "vulnerable populations," such as teachers or students in areas of conflict and crisis, in authoritarian regimes, in areas with gang violence, and in refugee contexts, or from teachers or students who are undocumented in terms of immigration status or who may be members of persecuted religious, ethnic, or sexual minority groups. IRB also is a process that often falls through the cracks in many international development education programs. The concept of IRBs evolved from the 1964 Helsinki Declaration to protect human subjects as part of medical research. The Helsinki Declaration was influenced by the Nuremberg Trials of 1945–1946.

In the United States, IRBs are administered on a federal level by the Office for Human Research Protections (OHRP), an office within the U.S. Department of Health and Human Services. OHRP assists IRBs in their work, and it receives and investigates claims of inappropriate research practices (United States Department of Health and Human Services, 2023.). The U.S. Department of Health and Human Services offers free, self-paced IRB training. Many educational organizations and universities will have IRBs whose job it is to ensure compliance with IRB guidelines. These typically require evaluators to submit a detailed description of the evaluation project, the list of human subjects to be surveyed or interviewed, the data collection instruments to be used, strategies for recruitment of evaluation participants—including evidence of consent forms—and a plan for ensuring confidentiality and protecting data. All of this is time-consuming and should be built into an evaluation timeline. A full checklist of U.S. government-funded program IRB requirements can be found at the Department of Health and Human Services: IRB Written Procedures site.[7]

[7] See https://tinyurl.com/cwkm8rve. A full list of various countries and regions and their ethical research requirements can be found here: https://www.hhs.gov/sites/default/files/ohrp-international-compilation-2021.pdf.

### 18.8.4 Align Expectations, Outcomes, Activities, and Evaluation

Evaluations often yield disappointing results, the origin of which has multiple causes: lofty goals combined with parsimonious program activities; ambiguous outcomes that are neither empirical nor measurable; the slow rate of teacher change and the problem of enactment (both discussed in Chapter 16) (Hord et al., 2006); inflated program expectations in terms of the design of the distance program; the gap between resources and expectations (Bonney et al., 2011); the fact that many intended effects are distal—measurable only in the long term—versus proximal (measurable soon after a distance course) (Gaible & Burns, 2007); and the fact that the effects of teacher professional development—student achievement and improved teaching—are incremental and are not completely visible by the end of a distance program (Kennedy, 2016, pp. 3–4).

To truly capture the effects of an intended program, distance education programs would do well to temper expectations about what a distance course can reasonably achieve in a set amount of time and develop clear, measurable learning outcomes that are reflected in course activities and in the evaluation design. Evaluators and distance educators may also have to moderate their expectations about what evaluations can reasonably measure during the lifespan of a course or program. Funders may have to help by supporting evaluations that continue "beyond the lifespan of a particular distance education program, (focusing) not just on an intervention but on the systems and stakeholders that influence learning transfer" (Kennedy, 2016, p. 4).

### 18.8.5 Exercise Caution in Consuming Evaluations

The above considerations deal with producing evaluations. A final consideration focuses on the consumption of evaluation information. Stakeholders, funders, and distance course developers often consult evaluations *of* evaluations as part of decision-making. These "meta-evaluations" often report measures of the impact or magnitude of the effect of a program on an outcome as an "effect size." These effect size magnitudes have traditionally been interpreted based on rules of thumb suggested by Cohen (1988), in which an effect size of approximately 0.20 is considered "small," 0.50 is considered "medium," and approximately 0.80 is considered "large." This standardized form of effect sizes is useful because it allows comparison of the magnitude of effects on different outcome variables and across different studies. Reporting effect sizes also allows other researchers to conduct meta-analyses and helps funders determine whether the difference between two distance programs or educational technology products is meaningful or not (Bakker et al., 2019).

Despite the value of effect sizes, however, evaluators have long cautioned that educators and decision-makers should interpret them carefully in making determinations about the overall effectiveness of an approach or distance modality. Effect sizes are broad generalizations that may have more to do with the design of a study than with the intervention itself, and they may have less to do with whether or not these magnitudes of effects are substantively or practically important (Bakker et al., 2019; Hill et al., 2008). A "small" effect size may hold enormous practical significance—the risk is in dismissing an approach by looking at effect sizes alone (Hill et al., 2008; Kraft, 2018). Evans & Yuan (2020), in a study of 156 RCTs that measured learning outcomes, note that effect sizes for changes to learning tend to be small to medium. A number of researchers have proposed that educators and decision-makers use different guidelines and new frameworks for interpreting effect sizes (Bakker et al., 2019; Hill et al., 2008; Kraft, 2018).

## 18.9 Conclusion: "The Greatest of Mistakes Is to do Nothing Because You Can Only Do a Little"

Evaluation is one of the most critical factors in the success of a distance learning program. However, despite the importance of measuring effects and uncovering evidence, distance education programs across the globe often face time, resource, access, and political constraints—realities that adversely impact the quality and utility—indeed, the ability—to conduct systematic evaluations of a distance education program.

As this chapter has detailed, evaluation is important, not just for a distance program itself, but for the fields of teacher pre-service and in-service education and distance education writ large. More tangibly, it is critical for teaching quality, which, as discussed in Chapter 8, is the most important school-related factor in a child's education. Distance education programs that embrace evaluations may do much to ultimately improve a child's learning; programs that eschew evaluations ultimately harm the quality of that learning. As the quote[8] that frames this conclusion admonishes, the gravest mistake a distance program can make is to fail to evaluate.

[8] Attributed to the English cleric, the Reverend Sydney Smith (1771–1845).

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## References


Bakker, A., Cai, J., English, L., Kaiser, G., Mesa, V., & Van Dooren, W. (2019). Beyond small, medium, or large: Points of consideration when interpreting effect sizes. *Educational Studies in Mathematics, 102*(1), 1–8. https://doi.org/10.1007/s10649-019-09908-4

Bamberger, M., & Mabry, L. (2019). *Real world evaluation: Working under budget, time, data, and political constraints.* Sage Publications.

Bonney, R., Ellenbogen, K., Goodyear, L., Hellenga, R., Phillips, T., Russell, L., . . . Yalowitz, S. (2011). *Principal investigator's guide: Managing evaluation in informal STEM education projects.* Center for the Advancement of Informal Science Education. https://www.informalscience.org/activities/principal-investigators-guide

Brookhart, S., & Nitko, A. (2011). Assessment of higher order thinking skills. In G. Schraw & D. Robinson (Eds.), *Strategies for constructing assessments of higher order thinking skills* (pp. 327–359). Information Age Publishing.

Burns, M. (2020). From theory to use: Making educational research more usable and useful for practitioners. *Annual Review of Comparative Education 2019 International Perspectives on Education and Society, 39*, 47–53. doi:https://doi.org/10.1108/S1479-3679202039

Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences.* Academic Press.

Duflo, E. (2004). Scaling up and evaluation. *Annual World Bank Conference on Development Economics* (pp. 341-369). World Bank.

Evans, D. K., & Yuan, F. (2020). *How Big Are Effect Sizes in International Education Studies? CGD Working Paper 545.* Global Development. https://www.cgdev.org/sites/default/files/how-big-are-effect-sizes-international-education-studies.pdf

Farm Radio International. (2017, June 30). *Final report: Her farm radio in Ethiopia, Malawi, Tanzania and Uganda.* Farm Radio International. https://farmradio.org/wp-content/uploads/2020/09/143-Her-Farm-Radio-Final-Report-to-IFAD-Sept-2017-2.pdf

Gaible, E., & Burns, M. (2007). *Using Technology to train teachers: Appropriate uses of ICT for teacher professional development in developing countries.* InfoDev | World Bank. https://www.infodev.org/articles/using-technology-train-teachers

Guskey, T. (2000). *Evaluating professional development.* Corwin Press.

Guskey, T. (2016, February). Gauge impact with 5 levels of data. *Learning Forward*. https://tguskey.com/wp-content/uploads/Professional-Learning-1-Gauge-Impact-with-Five-Levels-of-Data.pdf

Hill, C. J., Bloom, H. S., Black, A. R., & Lipsey, M. W. (2008). Empirical benchmarks for interpreting effect sizes in research. *Child Development Perspectives, 2*(3), 172–177. doi:10.1111/j.1750-8606.2008.00061.x

Hord, S., Rutherford, W. L., Huling-Austin, L., & Hall, G. (2006). *Taking charge of change.* Southwest Educational Development Laboratory.

Kennedy, M. (2016). How does professional development improve teaching? *Review of Educational Research, 86*(4), 945–980. doi:https://doi.org/10.3102/0034654315626800

Kozma, R., & Wagner, D. (2006). Core indicators for monitoring and evaluation studies in ICTs for education. In D. Wagner, B. Day, T. James, R. Kozma, J. Miller, & T. Unwin, *Monitoring and Evaluation of ICT in Education Projects* (pp. 21-32). World Bank.

Kraft, M. (2018). *Interpreting effect sizes of education interventions: Brown University working paper.* Brown University. https://scholar.harvard.edu/files/mkraft/files/kraft_2018_interpreting_effect_sizes.pdf

Kratochwill, T., Hitchcock, J., Horner, R., Levin, J., Odom, S., Rindskopf, D., & Shadish, W. (2010). *Single-case designs technical documentation.* U.S. Department of Education What Works Clearinghouse. https://files.eric.ed.gov/fulltext/ED510743.pdf

Leahy, M., Thielsen, V., Millington, M., Austin, B., & Fleming, A. (2009). Quality assurance and program evaluation: Terms, models, and applications. *Journal of Rehabilitation Administration*, *33*(2), 69–82. https://digitalcommons.usu.edu/sped_facpub/201/

Mindtools. (n.d.). *Kirkpatrick's model: Four levels of training evaluation*. Mindtools. https://www.mindtools.com/pages/article/kirkpatrick.htm

Minnesota Evaluation Studies Institute. (2018). *Minnesota Evaluation Studies Institute*. American Evaluation Association Evaluator Competencies. https://www.eval.org/Portals/0/Self%20assessment%201oct.pdf

Moon, B., Leach, J., & Stevens, M. (2005). *Designing open and distance learning for teacher education in Sub-Saharan Africa: A toolkit for educators and planners.* World Bank. http://oro.open.ac.uk/8401/1/teacher_education_toolkit_may13.pdf

Morris, E., Farrell, A., & Venetis, E. (2021, January). *A roadmap for for measuring distance learning: A review of evidence and emerging practices.* United States Agency for International Development: https://www.edu-links.org/sites/default/files/media/file/Measuring%20Impact%20and%20Outcomes_Final_01.20.2021-508%20%281%29.pdf

Patton, M. (2008). *Utilization-focused evaluation* (4th ed.). Sage.

Rossi, P., Lipsey, M., & Freeman, H. (2004). *Evaluation: A systematic approach* (7th ed.). Sage.

SAGE. (n.d.). *The SAGE encyclopedia of educational research, measurement, and evaluation*. SAGE Research Methods. https://methods.sagepub.com/

Scriven, M. (1991). *Evaluation thesaurus.* Sage.

Scriven, M. (2009). *The evaluation of training*. The Evaluation Center Western Michigan University: https://wmich.edu/evaluation/checklists

United Nations Evaluation Group. (2016). *Norms and standards for evaluation*. United Nations Evaluation Group. http://www.unevaluation.org/document/detail/1914

United States Agency for International Development. (n.d.). *CLA toolkit*. Learning Lab. https://usaidlearninglab.org/cla/cla-toolkit

United States Department of Health and Human Services. (2023). *Office for human research protections*. https://www.hhs.gov/ohrp/index.html

Van Nostrand, P., Noakes, S., Shah, Z., & Luna, L. (2022, February). *An overlooked indicator of edtech quality: The use of learning sciences research.* Digital Promise. https://doi.org/10.51388/20.500.12265/150

World Food Program Office of Evaluation. (2021, February). *Technical note principles, norms and standards for evaluations.* Evaluation Quality Assurance System (EQAS). https://docs.wfp.org/api/documents/WFP-0000003179/download/

Yarbrough, D., Shulha, L., Hopson, R., & Caruthers, F. (2011). *The program evaluation standards: A guide for evaluators and evaluation users* (3rd ed.). Sage.

Section II. Chapter 19

# ASSURING QUALITY

## Table of Contents

**Best Practice:** "Quality matters"—distance education programs must be committed to maintaining academic and instructional quality regardless of the mode of delivery.

## 19.1 Overview

Despite its increasing mainstreaming as a professional learning option, distance education still suffers from poor perception *vis-à-vis* in-person learning. Without a strong base in research and theory, distance education has often struggled for recognition by the traditional academic community. Without rigorous standards to assure the quality of distance-based teaching and materials development, distance education has battled perceptions of inferior quality even among distance instructors.[1] Without the formal mechanisms and institutions that assess processes and products, distance learning programs, especially those designed for donor-funded international education programs, have escaped evaluation and oversight. And without much in the way of longitudinal and evidence-based evaluation data (as noted in the previous chapter), many modes of distance education have struggled with perceptions of quality, impact, and effectiveness (Moon et al., 2005).

Because teaching and learning in a distance environment occur in the ether or across airwaves and not within the four walls of a classroom, distance learning often has escaped the scrutiny that may accompany face-to-face teacher professional development. (This situation is ironic since distance learning actually leaves more of a digital data and information trail than does face-to-face instruction.) Instructional delivery systems, the mechanics of learning, and the location of learning in distance environments often differ from those in brick-and-mortar settings. Distance learning programs often escape quality and accountability provisions because quality assurance and accreditation systems may lack the benchmarks, personnel, instruments, and protocols to assess and measure quality in a distance environment or because distance programs, particularly with universities, have failed to adapt face-to-face mechanisms and procedures to distance-based learning or failed to enforce minimum standards of quality control for online education.

In the United States, for example, a survey of 284 institutions of higher education prior to spring 2020 reported that 38% of public and 28% of private four-year institutions encouraged, but did not require, fully online courses to meet minimum standards for quality. Thirty-one percent of *private* four-year institutions required both modalities to meet quality standards. Among community colleges, which typically involve two-year programs of study, 27% *encouraged* online and in-person modalities to meet quality standards, while only 22% *required* online courses to meet standards (Garrett et al., 2021, p. 51).

"Quality" is a relative term. Students, teachers, employers, teaching assistants, university rectors, funding agencies, national ministry of education

[1] Diliberti (2018) reports that one of four virtual school teachers say that students learn far more in face-to-face settings.

officials, accreditors, assessors, and external distance education providers all may have specific and competing notions of quality. They may believe that they "know it when they see it" yet be unable to articulate its constituent attributes. These realities, coupled with competing priorities and, in many regions, a desire to get as many learners in and out of the distance education system as quickly as possible, means that "quality" in distance learning often remains ill-defined and elusive.

Successful distance education programs must take to heart Perraton's (1993) admonition that "quality matters" and define what quality means, developing, adapting, and incorporating quality assurance mechanisms, monitoring, and compliance into the design and delivery of distance learning opportunities for pre-service teacher candidates and teachers. As this chapter will emphasize, no distance education program is too big—or too small—to do this.

## 19.2 Quality Assurance

"Quality" in this chapter refers to the degree of excellence of a distance program. It represents adherence to a set of standards of content, design, and instruction; proof that learners emerge with a set of useful and usable knowledge and skills; and verification of both by an external, impartial accrediting agency or internally by a quality assurance team established by the distance education program itself (George et al., 2014; Reid & Kleinhenz, 2015).

"Quality assurance" in distance education represents the collective efforts taken to ensure a level of education that meets prescribed standards. Belawati & Zuhairi (2007) define it as "systematic management and assessment procedures adopted in order to monitor performance against objectives and ensure the achievement of quality outputs and quality improvements." Quality assurance focuses on planning, design, coordination of instructional and learning materials development, implementation and management, and monitoring and evaluation (UNESCO Insititute for Lifelong Learning, & Commonwealth of Learning, 2021). It is part of a value system that includes process control, continuous improvement, commitment, and breakthrough (Van Kemenade et al., 2008, as cited in Zuhairi et al., 2020).

### 19.2.1 Best Practice Frameworks: The 5Ps

While standards and standards frameworks vary, most appear to have a cross-cutting common focus on key areas associated with distance education—personnel, planning, processes, production and delivery, and philosophy (Santally, 2016; Zuhairi et al., 2020).

Figure 19.1 references these key areas using a selection of national standards (Southern Regional Education Board, 2016; Digital Promise, 2022); regional standards (Manitoba Remote Learning Support Centre, 2020); and international standards (Quality Matters, Virtual Learning Leadership Alliance, & Digital Learning Collaborative, 2023); the e-Learning Maturity Model, [Marshall, 2007]; the Association for Educational Communications and Technology, 2012) for online learning and educational technology over a 15-year period (2007–2022).

These standards were chosen as an informative overview of what quality assurance (QA) standards typically involve—meant to *illustrate* the various building blocks of assessing and assuring quality. Many of the standards referenced follow a "maturity" model—rubric-based gradations of quality—while others simply list the standard. The reader will note that in many cases, the same standard might transect a number of aspects.

Not all QA frameworks measure all aspects of distance education equally. Indeed, across multiple distance education quality frameworks, certain distance education standards—those dealing with instructional analysis, design, and development—appear most frequently, while standards focusing on faculty support and satisfaction, policies, and planning are "under-represented" (Martin et al., 2017). Two other important, and often overlooked, standards deal with cultural sensitivity and linguistic appropriateness—particularly noteworthy omissions given the increased trans-nationalization of distance education programs (Santally, 2016).

As the reader will infer from the range of indicators listed in Figure 19.1, quality assurance can be costly. One estimation of how costly comes from the Open University of Israel (OUI). This public university, which educates an estimated 47,000 learners per year, has employed rigorous QA procedures examining the accuracy and currency of content; clarity of explanations; adherence to standards of self-study; visual appeal and stimulation of presentations; evidence that activities and assignments enhance learning in comprehending the main points and critical issues; and ensuring that all work can be completed in 15 to 20 hours, the time allotted for all study units (Open University of Israel, n.d.).[2] Guri-Rosenblit's 1997 estimate of the total cost of this level of quality, converted to 2022 USD, suggests that this level of effort costs approximately US $472,134 (United States Department of Labor, n.d.).

**Figure 19.1**
**The Five Ps of Quality Assurance: Personnel, Planning, Processes, Production and Delivery, and Philosophy (Standards selected are taken from Marshall (2007); see also Association for Educational Communications and Technology (2012); Digital Promise (2022); Manitoba Remote Learning Support Centre (2020); (Quality Matters, Virtual Learning Leadership Alliance, and Digital Learning Collaborative, 2022, 2023); Southern Regional Education Board (2016)).**

| Aspect | Purpose | Examples of Standards |
|---|---|---|
| **1. Personnel:** This includes everyone involved in designing, managing, instructing, assessing, supporting, and evaluating distance education offerings. | Ensuring that all distance education personnel are qualified and that there is leadership around and management of distance learning | • Distance instructors are trained and certified to teach online.<br>• Instructional designers are trained and certified to design courses.<br>• Instructors are selected and prepared in the distance education mode they will use.<br>• Distance instructors are assessed against a set of metrics.<br>• Instructors have a university degree or better in the area in which they teach.<br>• There is sufficient staffing of IT professionals to support distance learning. |
| **2. Planning:** This may include needs assessment, documenting appropriate learning activities, selection of technologies, budgeting, and resource allocation. | 2A. Planning the distance education system | • School and state/provincial leaders advocate for technology-based professional development for teachers, administrators, school boards, and community leaders.<br>• The distance education entity analyzes data from needs assessment to decide on a set of course offerings. |

[2] Although dated, this study was chosen as an example because it provided specific financial costs related to quality assurance.

| Aspect | Purpose | Examples of Standards |
|---|---|---|
| **2. Planning:**<br>This may include needs assessment, documenting appropriate learning activities, selection of technologies, budgeting, and resource allocation.<br><br>*(continued)* | | • Learning objectives guide the design of courses.<br>• The technology chosen is assessed to be the best means of delivering content and instruction for that particular teacher-learner audience. |
| | 2B. Educational technology products (NB: In some frameworks, technology may be part of planning; in other frameworks as part of processes) | • Research has confirmed that the technology product is effective for its intended purpose.<br>• The technology product addresses an educational or administrative need.<br>• The technology product has been evaluated in an evidence-based study by an independent third party (e.g., Digital Promise's Evaluating Studies of EdTech Products Tool). |
| **3. Processes:**<br>These include the functions of distance education: registering, instructing, tutoring, and supporting learners; record keeping; and assessment. | 3A. Tutoring learners, assessing their written work, and providing feedback; monitoring instructors | • Continual professional development is provided for instructors, tutors, mentors, coaches, course designers, and other stakeholders.<br>• Audio, video, and instructional scripts are sampled to assess quality and are revised and validated accordingly.<br>• Instructors are required to provide extensive feedback to learners. |
| | 3B. Evaluation and revision | • Instructors have participated, as learners, in the distance education mode in which they will be teaching.<br>• The online course uses multiple methods and sources of input for assessing course effectiveness.<br>• The online course is reviewed to ensure that the course content is current. |
| | 3C. Learner supports | • Learners are supported in developing self-regulation skills (for environment, cognition, behaviors, and motivation).<br>• Remediation and accelerated courses for learners are provided.<br>• All accommodations are made for learners with special needs.<br>• Learners have opportunities to observe successful peers |

| Aspect | Purpose | Examples of Standards |
|---|---|---|
| **3. Processes:** These include the functions of distance education: registering, instructing, tutoring, and supporting learners; record keeping; and assessment. *(continued)* | 3D. Selection of appropriate technologies (NB: In some frameworks, technology may be part of processes; in other frameworks as part of planning) | • Technology accommodations are in place for learners with special needs (e.g. assistive technologies)<br>• The learning management system (LMS) and education management information system (EMIS) are interoperable so that learner grades transfer seamlessly from the LMS to the EMIS.<br>• Mechanisms are in place for maintaining the technology infrastructure to improve learning and performance.<br>• Technology providers conform to ISO IEC 20000-1 (a set of standards outlining best practices for maintaining security, delivering consistent service, and adopting innovative technologies as they become available) or any other relevant standards. |
| **4. Production and Delivery:** This includes all facets of course design, including selection and repurposing of materials; translations; development of learning objects, activities, job aids, quizzes, and branching scenarios. | 4A. Course production | • There is documented adherence to eLearning delivery standards.<br>• There is documented adherence to national curriculum standards.<br>• Materials and courses are field tested.<br>• Quality control and assurance measures are in place and are enforced.<br>• Materials are visually appealing and follow good design and layout principles. |
| | 4B. Content and materials design | • Instructional designers demonstrate foundational knowledge of the contribution of research to the past and current theory of educational communications and technology.<br>• Course materials (e.g., textbooks, primary source documents, Open Educational Resources) that support course content standards are accurate and current.<br>• The online course is free of inappropriate content and avoids unnecessary advertisements.<br>• Copyright and licensing status for any third-party content are appropriately cited and easily found.<br>• Materials are culturally sensitive and linguistically appropriate (Santally, 2016). |

| Aspect | Purpose | Examples of Standards |
|---|---|---|
| **4. Production and Delivery:** This includes all facets of course design, including selection and repurposing of materials; translations; development of learning objects, activities, job aids, quizzes, and branching scenarios.<br><br>*(continued)* | 4C. Course delivery | • Learners are provided with expected instructor response times to learner queries.<br>• There are regular and substantive instructor-to-learner expectations and predictable or scheduled interactions and feedback, appropriate for the course length and structure.<br>• Content, syllabus, course documentation, assessments and other course-related are in locations known to learners and easy to find.<br>• Learner work is subject to specified timetables and deadlines. |
| **5. Philosophy (of quality):** This is evidenced by individual roles and responsibilities, policies, mission statements, and accountability measures. | 5A. Policy statements | • The educational institution's written policies support importance of distance education programs.<br>• The vision statement and learning objectives are developed by the institution and provide foundation for the distance learning program.<br>• Policies are supported by procedures (i.e., training, support, materials, resources, and technology) to ensure that distance learning programs attain quality.<br>• Measures of quality are codified and widely disseminated. |
| | 5B. Culture of total quality management | • All personnel adhere to the contemporary professional ethics of the field as defined and developed by the accrediting agency or standards framework.<br>• All levels of the educational institution promote a culture of continual improvement in the effectiveness and efficiency of all elements of distance learning.<br>• Problems are not hidden or avoided but addressed and remedied.<br>• There are transparent, documented sets of procedures and control of process.<br>• Top management participate in and are committed to the distance learning program in general and to quality distance education procedures in particular. |

As also suggested by Figure 19.1, adhering to quality frameworks in distance education is time-, labor-, and human resource-intensive. Taken together, the financial and human-resource–intensive nature of developing distance courses for teacher-candidates and teachers can be formidable and overwhelming, particularly if local expertise in design and instruction is not widely available. But for any distance education program to be successful, all stakeholders—teacher trainees, principals, school management teams, teachers, education officers, students, community members, and departments of education—must be consulted and, where needed, their capacity developed to ensure unity of purpose, collaboration, and a sense of ownership of the distance education program (Quan-Baffour & Akwasi, 2018, p. 17). This is critical, as Quan-Baffour and Akwasi observe, because "ensuring quality in... teacher education is every citizen's business" (p. 21). One model of such inclusiveness is the Caribbean Area Network for Quality Assurance in Tertiary Education, profiled in Figure 19.2.

**Figure 19.2**
**Quality Assurance in the Caribbean**

The small island states of the Caribbean have received a good deal of attention from offshore distance education providers and medical schools. As a result, they have been particularly aggressive about establishing mechanisms of quality assurance and accreditation. The Caribbean Area Network for Quality Assurance in Tertiary Education (CANQATE) is a QA network that includes Caribbean government ministries, state agencies, higher education networks, and other related entities within the Caribbean Community (CARICOM) that provide research and capacity building on quality assurance (CANQATE, 2021).

## 19.2.2 The Importance of Standards

Quality assurance is grounded in standards. As articulated throughout this guide, standards are a clear baseline of expectations (competencies) for a particular domain within distance learning. *Domains* refer to the broad areas of professional knowledge, skills, and practice that are part of distance learning, such as course design, assessment, instruction, and interaction. Standards define the minimum level of quality and help to create a consistent, shared understanding of common terminology, quality, and structure.

While standards are broad, they are typically disaggregated into more measurable and discrete indicators. *Indicators* are more specific descriptions of actions and behaviors related to each standard. They often are presented as statements of action that serve as a road map for implementation. Because each standard varies in its complexity, the number of indicators also varies according to the standard.

Standards are essential for several reasons. They establish the minimum criteria for quality. They frame the parameters of the course, reflecting goals and objectives and clearly specifying the skills to be acquired, learning methods used, all inputs and activities, and what and how technology should support learning. They serve as outcomes by which to gauge program success and the quality of teaching and learning. Finally, standards can serve as yardsticks by which online designers and instructors can measure their own self-improvement goals. All of these factors contribute to defining quality and measuring it.

The reader will recall from Chapters 8, 9, 11, 13, and 18 that there is no one set of definitive standards—countries and distance education programs employ a variety of standards. These may include, for example, national standards or international standards or benchmarks, such as the Open Learning Consortium's Quality Scorecard (Online Learning Consortium, 2020); National Standards for Quality Online Learning

(Quality Matters, Virtual Leadership Alliance, and Digital Learning Collaborative, 2023); or those of the Australasian Council on Open, Distance and eLearning (Australasian Council on Open, Distance and e-Learning, 2017). In some settings, standards must be approved by accreditation boards; in other settings, standards may not be obligatory; and in some contexts, the particular set of standards may not matter as much as simply having a set of standards that a distance program follows.

### 19.2.3 Options for Assuring Quality

Many distance education programs may be too small or short-staffed to invest substantial amounts of time or money into quality assurance, but they still can infuse quality throughout their programs. For example, they can train distance instructors, use best practices associated with teacher professional development in general (such as Learning Forward's "Standards for Professional Learning" [2022]), and ensure that digital materials are of the highest quality.

There are other options for assuring quality in a pre-service or continuous professional development course for teachers. This section explores three of them: adopting and adapting existing QA frameworks for design and delivery of a course as part of a formal or informal QA process; developing internal monitoring procedures; and using user experience (UX) frameworks.

#### Utilize existing quality assurance frameworks

Distance programs can develop QA checklists or use existing ones. The following examples of QA frameworks can be tailored to individual distance courses and programs:

- **The Benchmarking Framework for Online, Open, Smart, and Technology-Enhanced Higher Education.** This is an assessment tool for dual-mode, online, and open universities to help them identify strengths and fix weaknesses through a benchmarking process. Spearheaded by Hamdan Bin Mohammed Smart University in Dubai, the framework has been adopted by a consortium of 24 universities, university associations, and open and distance learning consortia, such as Azerbaijan's Western Caspian University, Italy's Open UniNettuno University, the Association of Arab Universities, and the European Association of Distance Teaching Universities (Hamdan Bin Mohammed Smart University, 2022).
- **Guidelines for Quality Assurance and Accreditation of MOOCs.** Developed by the Commonwealth of Learning (COL), which has a distinguished pedigree in the field of distance education, this is one of the few frameworks for assessing the quality of MOOCs. It is licensed under Creative Commons and can be freely adapted (Commonwealth of Learning, 2016).
- **The Commonwealth of Learning's Review and Implementation Model (COL-RIM).** Also from COL, the Review and Implementation Model is particularly helpful for distance education programs that may not have QA teams or who are embarking for the first time on the QA trajectory. It is a step-by-step guide that walks distance education programs through the QA process in a comprehensive and detailed manner (George et al., 2014).
- **The Online Learning Consortium's Open Scorecard for Online Learning.** Developed by the Online Learning Consortium, the Quality Scorecard Suite provides institutions with the "necessary criteria and benchmarking tools to ensure online learning excellence for the entire institution" (Online Learning Consortium, 2020).
- **Quality Matters Emergency Remote Learning Checklists.** Developed by the non-profit Quality Matters, these checklists assessed emergency remote higher education, primary and secondary-level online courses during the 2020 COVID-19 pandemic and are still relevant (Quality Matters, 2020).
- **The eLearning Toolkit.** This rubric from Canada's Western University, which offers both in-person and distance courses, allows designers to assess the quality of eLearning tools and software (Western University, 2018).

- **Quality Assurance Standards Framework and Outcomes Metric.** This was developed by the Education Quality Outcomes Standards Board (EQOS), a nonprofit organization that has built and maintains a framework of universal definitions of learning outcomes and their corresponding metrics. The framework is a new outcomes-based system of quality assurance to allow virtual schools and other types of alternative education systems to report outcomes through the lens of the "customers" (i.e., learners and future employers) related to learning, completion, placement, earnings, and satisfaction that each program could claim to provide (Education Quality Outcome Standards, 2018).

### Develop internal monitoring mechanisms

There are other ways to begin to assess quality besides quality assurance frameworks. Distance programs can have learners regularly evaluate instructors and course offerings. They can conduct surveys, examine course evaluations, and grade patterns, and engage in focus groups and interviews with learners. They can drop in and observe distance courses—which is particularly easy to do in online learning—and audit selected materials. They can track teacher graduates and interview them as to how effective and useful they found their pre-service or in-service distance education experience. Further, distance education providers can solicit input from schools about the effectiveness of teacher graduates. All of these activities can comprise an overall QA system, or they can be separate activities; however, every distance education program, small or large, should conduct some form of monitoring. Like all forms of quality monitoring, though, this information is useful only if acted upon.

### Employ user experience (UX) frameworks

The concept of "user experience" in distance learning was touched upon in *Chapter 11: Instructional Design*. For online, blended, and mobile courses, a number of simple, straightforward user experience frameworks are available that can be deployed to assure quality as well as be adapted for other types of distance education.

One example is Morville's "Honeycomb" framework, so called because its visual organizer is in the hexagonal shape of the cells in a bee's honeycomb. It examines users' experiences based on the following criteria: utility, desirability, accessibility, credibility, findability, usability, and perceived value (Morville, 2004). This framework can be administered as part of a distance course in a checklist or Likert-scale fashion.

A second example is the 5E model (Quesenberry, n.d.). Although this framework is used to assess learners, and is sometimes used as a course design framework, it also offers a general framework for examining the learner's assessment of the quality of a course. It contains five constructs and lends itself to interviews or open-ended questionnaires for learners, as follows:

- **Effective.** How completely and accurately were goals reached?
- **Efficient.** How quickly was the work completed?
- **Engaging.** How well did the interface draw the user into the interaction? How pleasant and satisfying was the learning experience?
- **Error tolerance.** How well did the program prevent errors and help the learner recover from errors that occurred?
- **Easy to learn.** How well did curriculum and instruction support continued learning throughout the lifetime of the course?

### Allow institutions to develop their own standards and measures

There is concern that the uniform standards-based approach of quality assurance discussed in this chapter may ill serve many types of distance education institutions. Virtual schools, for example, often function in the capacity of credit recovery or as a path to alternative education for students who do not learn well in brick-and-mortar settings. Yet, despite their unique mission and their heterogeneity (as discussed in Chapter 13), they are evaluated on the same set of inputs as brick-and-mortar schools.

Horn (2021) thus argues for a new set of standard metrics for such schools based on outcomes—relative to the students each school serves—which focus on objectives tailored to the school's mission, with clear data audited by an independent third party so families and future employers can accurately compare alternative education options and accurately gauge the quality of such schools and graduates (p. 3). This quality assurance could be attained via independent third-party auditors following the rules governing financial auditing of publicly traded companies or by using a framework such as EQOS's Quality Assurance Standards Framework and Outcomes Metric, mentioned previously.

Successful quality assurance requires effective and efficient structures and procedures. However, as UNESCO's Institute for Lifelong Learning and the Commonwealth of Learning (2021) caution, creating QA structures will not automatically improve quality. Organizations must distinguish between "quality assurance procedures, which can easily become compliance-focused, and real efforts to enhance quality" (p. 51). And standards, metrics, and philosophy statements are just words on paper (or a screen) unless the individuals within distance education programs are committed to institutionalizing and measuring quality and using that information to learn and improve their programming. To be effective then, quality assurance must be grounded in a belief system of "team building, organizational learning, genuine enquiry, and an honest effort to improve" (George et al., 2014, p. 2). As the UNESCO Insititute for Lifelong Learning & Commonwealth of Learning emphasize, quality assurance in open and distance learning "must be about continuous improvement" (2021, p. 51).

Yet, while there is a growing consensus within distance education that a strong accountability system should address the main elements of teaching and learning via distance, there is still, in many cases less consensus about the specific metrics, indicators, and performance thresholds that should be included in such a system.

## 19.3 Accreditation

A final option in assuring quality is for distance education programs to participate in an accreditation process and become an accredited education provider. This route is often taken by universities and other institutions of higher education.

Accreditation is a method of quality assurance carried out by an external third-party organization. It assures the public, as well as potential and actual learners, that standards and reliable indicators ensuring institutional quality are in place, that they guide all teaching and learning inputs and activities, and that there is a functioning system assuring monitoring and quality compliance. Learners who graduate from accredited institutions have greater opportunities for employment, continued education, and mobility (Distance Education Accreditation Commission, 2022, pp. 4, 6). When implemented as intended, the accreditation process also can promote an ethos of continuous reflection and improvement within a distance education program. For example, quality assurance can ideally eliminate or minimize the weaknesses of a distance program and better align its actual performance with standards through an iterative process of continuous improvement, such as the "Plan-Do-Check-Act" approach (Leahy et al., 2009, p. 70).

The process of accreditation and convergence of quality standards at the higher-education level has been accelerated in part by the Bologna Process, a series of agreements between European countries creating a European Higher Education Area (EHEA). It attempts to ensure comparability in the standards and quality of higher-education qualifications among its signatory countries.[3]

[3] These countries are Albania, Andorra, Armenia, Austria, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Kazakhstan, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Montenegro, The Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Russian Federation, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom, and Vatican City.

While the Bologna Process does not specifically address online learning *per se*, many universities and higher education institutions across Europe have incorporated online learning into their programs and curricula. In June 2022, the Council of the European Union (EU) adopted a formal recommendation regarding a European approach to micro-credentialing—involving blended and online learning—across institutions (European Commission, n.d.). However, the Bologna Process does not yet appear to have explicit regulations regarding online learning, so each country and institution is responsible for setting its own policies and standards in this area.

Accreditation also is increasingly common in distance education courses or programs that are not necessarily affiliated with a university. For example, the International Accreditors for Continuing Education and Training (IACET), an accrediting organization, uses the American National Standards Institute (ANSI)/IACET Standard for Continuing Education and Training, which focuses on the design, development, implementation, and evaluation of continuing education and training programs for adult learners, such as teacher professional development (IACET was the developer of the "continuing education unit" [CEU]). To become an IACET-approved provider of CEUs, organizations such as Education Development Center undertake a rigorous application process that includes demonstrations of their best practice policies and processes for developing online CEU courses. All aspects of the courses are then measured against the nine internationally recognized categories included in the ANSI/IACET Standard (International Accreditors for Continuing Education and Training, n.d.).

### 19.3.1 Accrediting Bodies

Accrediting bodies are essentially QA agencies. They develop and implement common standards and procedures to measure educational quality. Depending on the country, accreditation of online programs may be voluntary, mandatory, or non-existent. There are a number of types of accrediting bodies, including the following:

- **Government agencies.** Examples include the Australian Government Department of Education and Training Tertiary Education Quality and Standards Agency (TEQSA) or the United Kingdom's Office for Standards in Education (Ofsted) (Australian Government Department of Education Training Tertiary Education Quality and Standards Agency, 2017; Government of the United Kingdom, 2021).
- **National accreditation organizations.** These often are independent, private, not-for-profit organizations and include Quality Assurance Commons or Quality Matters; the Distance Education Accreditation Commission (U.S.); the Association of Universities and Colleges of Canada (AUCC); the American National Standards Institute (ANSI); and the International Accreditors for Continuing Education and Training (IACET). These national organizations often, but not always, operate transnationally, too (QA Commons, n.d.; Distance Education Accreditation Commission, 2022; Quality Matters, Virtual Learning Leadership Alliance, and Digital Learning Collaborative, 2022, 2023; CanadaEdu, 2021; Association of Universities and Colleges of Canada, n.d.; American National Standards Institute, 2023; International Network for Quality Assurance Agencies in Higher Education, 2022).
- **Regional accreditation agencies.** Examples include the Arab Network for Quality Assurance in Higher Education (ANQAHE, n.d.); Asian Association of Open Universities (AAOU, 2022); the European Association for Quality Assurance in Higher Education (ENQA, 2022); the African Council for Distance Education (ACDE, 2022); and the Caribbean Area Network for Quality Assurance in Tertiary Education (CANQATE, 2021) (See Figure 19.2).
- **Transnational accreditation organizations.** These include the International Network for Quality Assurance Agencies in Higher Education (INQAAHE, 2022) and the International Council for Open and Distance Education (ICODE, 2020).

### 19.3.2 The Accreditation Process

Accreditation is an extensive, multidimensional, and lengthy process that occurs regularly after a fixed number of years, depending on the requirements of the accrediting body. The accreditation process is guided by examination of a set of standards to ascertain the degree to which a distance-based institution or program is adhering to these standards. This presupposes that distance programs are guided by a set of standards and that these standards have been communicated to all those involved in the design, management, instruction, and technical support that are part of the program.

Accreditation also assumes that the distance education program itself, or the larger educational institution within which it is housed, has an established monitoring and evaluation (M&E) system that gathers data on those standards. And it assumes that the systems for data collection, data management, and reporting are simple and efficient. M&E systems are particularly important for projects seeking to assess changes over time, as is the case with assessing learning outcomes (UNESCO Insititute for Lifelong Learning and Commonwealth of Learning, 2021, p. 53).

Peer review lies at the core of the accreditation process for institutions of higher education (Distance Education Accreditation Commission, 2022). Peer review bodies, such as the national, regional, and international organizations mentioned on this and the preceding page, and peer review processes are inseparable from accreditation. The peer review process allows institutions to be evaluated by other education professionals working in the same fields who understand the requirements and demands from a shared perspective, and who can suggest remedies and supports. It provides checks and balances from within the higher education or online learning fields, so distance education programs have an opportunity to make any changes necessary to meet learners' educational goals (Distance Education Accreditation Commission, 2022, p. 7).

However, as with any group composed of human beings, and processes driven by human beings, peer reviews can be susceptible to subjectivity, potential conflicts of interest, human error, or bias. Thus, accreditation processes and procedures must be carefully designed to safeguard the integrity and quality of institutional and program reviews. They can do this by incorporating four primary features: (1) transparency in requirements, standards, and findings; (2) multiple layers of review by different evaluators; (3) extensive safeguards against conflicts of interest; and (4) mechanisms for due process afforded throughout the process (Distance Education Accreditation Commission, 2022, p. 11).

Although the exact monitoring and assessment system varies among accrediting bodies and peer reviews, the process of accreditation typically involves the following:

- **Data from multiple sources.** These data can include indicators by which standards are measured, graduation rates, course enrolments, learner course satisfaction surveys, or completion rates for online courses. Data may be gathered from interviews with distance instructors, distance learners, course designers, and other relevant personnel, and, in particular, systematically collecting and analyzing learner feedback as a core component of academic QA mechanisms (Hope, 2006). The blend of quantitative and qualitative information enhances data quality and ensures that the full range of issues and concerns that are likely to emerge during an evaluation study are captured (UNESCO Insititute for Lifelong Learning and Commonwealth of Learning, 2021, p. 53).
- **Self-study/self-examination.** This is often (but not always) a yearlong process in which the distance learning program or institution assesses the degree to which its work is characterized by the practices articulated in the accrediting body's standards for accreditation. The output of the self-study is a School (or Program) Improvement Plan.

- **On-site visitation.** For dual-mode institutions or hybrid distance programs, on-site visits are undertaken by an external team of peer reviewers who determine the extent to which a learning institution or program meets the standards for accreditation by reviewing evidence, interviewing personnel, and conducting observations of distance learning-related activities. Representatives of the accrediting agency develop a written evaluation report for the program or institution, describing strengths and recommendations for improvement in terms of the standards for accreditation.
- **School/Program Improvement Plan.** An improvement plan outlines goals, strategies, and action steps to improve the quality of education offered. Ideally a school improvement plan is undertaken collaboratively with all distance education stakeholders. Through annual reporting, the distance education entity assures the accrediting agency that it is addressing identified needs in a timely fashion.

### 19.3.3 Benefits of the Accreditation Process

Formal accreditation is expensive, time-consuming, and often fraught, especially when institutions or distance programs fail to meet required standards. It is also extraordinarily valuable for several reasons.

First, accreditation communicates quality to learners, institutions, the public, the government, and potential employers. It provides assurances that an education program or online learning program has met established standards necessary to produce graduates who have achieved stated learning outcomes and are ready to enter the global marketplace.

Second, if taken seriously—as opposed to being a simple compliance exercise—the self-study and formal evaluation process can assist in program improvement by equipping distance education leadership and stakeholders with the ability to identify and address challenges in their learning environments and to build local capacity to qualitatively improve their distance education offerings.

Third, if the QA system in place offers ongoing training, capacity building, and support, then the accreditation process can catalyze improvements in the individual and collective capacity and qualifications of distance instructors and leaders of distance programs.

Fourth, accreditation by a respected accreditation agency—not all accreditation agencies are equal—confers the imprimatur of quality and excellence on a distance learning program. This is important not only for distance learners but also for those who design, manage, and instruct in distance programs.

Finally, to return to the beginning chapters of Section II of this guide, good teachers matter. The purpose of any distance education program is to ensure that its graduates or participants embrace excellent teaching. A systematic focus on quality is a positive step in making this goal a reality.

## 19.4 Conclusion

If there has been a throughline in Section II of this distance education guide, it is that quality matters—distance instructors must be highly qualified; distance courses must be designed according to recognized standards; and the teaching and learning activities of distance courses must be steeped in standards-based practices. Quality must be defined, implemented, and measured in all modes, models, and methods of distance education.

Distance education, like educational technology in general, is a constellation of commercial hardware, software, course management systems, personalized "solutions," and service providers, all of whom lay claim to having the highest-quality digital tools, courses, approaches, or media. This quality imperative is even more critical given the increased globalization of higher education; the commercialization, globalization, and massification of distance education; and the expansion of various forms of distance education, particularly hybrid and online learning, largely as a result of the COVID-19 pandemic. Donor-funded education projects, virtual and hybrid universities, single- and dual-mode universities, and teacher training institutions should embrace, address, and explicitly design quality inputs and processes as part of any distance learning program. In many countries, universities and teacher training institutions are under extreme financial duress; nonetheless, they must be cognizant of their role as degree-granting institutions and adhere to exacting standards.

Donor-funded education programs—particularly those that employ a variety of distance modes and are often tasked with upgrading the skills of a country's teaching force—must design, deliver, instruct, and evaluate distance learning programs, based not on their instincts of what constitutes quality, on political expediency, on past practices, on complacency, or on groupthink. Rather determinations of quality must be based on recognized, reliable, and valid national or international standards of distance teaching, design, and content development, such as those mentioned in this chapter as well as in Chapters 8, 9, 11, 12 and 13.

Finally, technology companies offer distance learning and technology-based "solutions" to improve teaching and learning. They often benefit directly from taxpayers—via public-private partnerships with governments or educational agencies, via multilateral or bilateral donor agencies, or via subscription and licensing fees. This confers on them a moral imperative to build their products according to recognized QA standards based on evidence about what works best in teaching and learning. They should use learning sciences research information to inform continuous improvement throughout their product development so distance educators are confident that the products' purpose will match the learners' needs (Van Nostrand et al., 2022, p. 21).

The attraction of distance education for many stakeholders is that it offers education at scale. In these economies of scale, where governments, donor agencies, technology vendors, and universities search for the lowest-cost solutions, the risk is that large-scale distance education providers drive out small-scale ones, and poor-quality courses force out high-quality courses, with teachers and students suffering as a result. A quality assurance system that is rigorously developed, maintained, and implemented can serve as a bulwark against this threat.

Citation: Burns, M. (2023). Assuring Quality. In *Distance Education for Teacher Training: Modes, Models and Methods.* (2nd Edition). Washington, DC: Education Development Center.

## References


African Council for Distance Education. (2022). *African Council for Distance Education*. Quality Assurance. https://acde-afri.org/

American National Standards Institute. (2023). *We Facilitate Standardization Solutions*. American National Standards Institute. https://ansi.org/

Arab Network for Quality Assurance in Higher Education. (n.d.). *Arab Network for Quality Assurance in Higher Education*. Arab Network for Quality Assurance in Higher Education. http://www.anqahe.org/index.html

Asian Association of Open Universities. (2022). *Asian Association of Open Universities*. Asian Association of Open Universities. https://www.aaou.org/

Association for Educational Communications and Technology. (2012). AECT Standards, 2012 version. https://www.aect.org/docs/AECTstandards2012.pdf

Association of Universities and Colleges of Canada. (n.d.). *Study in Canada*. Association of Universities and Colleges of Canada. https://studying-in-canada.org/association-of-universities-and-colleges-of-canada/

Australasian Council on Open, Distance and e-Learning. (2017). *Threshold Standards for Online Learning Environments*. ACODE. https://www.acode.edu.au/pluginfile.php/1530/mod_resource/content/1/ACODE_TSFOLE_draft_1.2.pdf

Australian Government Department of Education Training Tertiary Education Quality and Standards Agency. (2017). *Quality Assurance of Online Learning Toolkit.* TEQSA. https://www.teqsa.gov.au/

Belawati, T., & Zuhairi, A. (2007, March). The practice of a quality assurance system in open and distance learning: A case study at Universitas Terbuka, Indonesia. *The International Review of Research in Open and Distance Learning, 8*(1). https://www.irrodl.org/index.php/irrodl/article/view/340

CanadaEdu. (2021). *CanadaEdu.* Online Degree in Canada. https://www.canadaedu.in/online-degrees/

Caribbean Area Network for Quality Assurance in Tertiary Education. (2021). *CANQATE*. http://canqate.org

Commonwealth of Learning. (2016). *Guidelines for Quality Assurance and Accreditation of MOOCs*. Commonwealth of Learning. http://hdl.handle.net/11599/2362

Digital Promise. (2022). *Evaluating Studies of Ed-Tech Products*. Digital Promise. https://digitalpromise.org/wp-content/uploads/2016/04/DP_EvaluatingTheResults.pdf

Diliberti, R. (2018). *Assessing Quality: Teachers' Perceptions of State Virtual School Courses.* Doctoral dissertation, Oakland University. https://www.proquest.com/openview/50755657e4371f47f36f7feabba7ac66/1

Distance Education Accreditation Commission. (2022). *The DEAC Handbook.* Distance Education Accreditation Commission. https://www.deac.org/Seeking-Accreditation/The-DEAC-Accrediting-Handbook.aspx

Education Quality Outcome Standards. (2018). *Quality Assurance Standards Framework and Outcomes Metric*. Education Quality Outcome Standards. https://img1.wsimg.com/blobby/go/fd25bcaa-0dca-4fc5-96bc-30c8ae4e5867/Quality-Assurance-Standards-January-2018(3).pdf

European Association for Quality Assurance in Higher Education. (2022). *European Association for Quality Assurance in Higher Education*. European Association for Quality Assurance in Higher Education. https://www.enqa.eu/

European Commission. (n.d.). *The Bologna Process and the European Higher Education Area*. European Education Area: Quality education and training for all. https://education.ec.europa.eu/education-levels/higher-education/inclusive-and-connected-higher-education/bologna-process

Garrett, R., Simunich, B., Legon, R., & Fredericksen, E. (2021). *CHLOE 6: Online Learning Leaders Adapt for a Post-Pandemic World, The Changing Landscape of Online Education, 2021.* Quality Matters. https://www.qualitymatters.org/qa-resources/resource-center/articles-resources/CHLOE-6-report-2021

George, N., Donovan, C., Plimmer, G., Schmidt, A., Gatsha, G., & Clarke-Okah, W. (2014, June). *Handbook for the Commonwealth of Learning Review and Improvement Model.* Commonwealth of Learning. https://oasis.col.org/colserver/api/core/bitstreams/ecbf898b-9177-4944-9ac1-cc8f51aa3fb3/content

Government of the United Kingdom. (2021, December 24). *Policy paper: Accreditation for online education providers.* Government of the United Kingdom. https://www.gov.uk/government/publications/accreditation-for-online-education-providers/accreditation-for-online-education-providers

Guri-Rosenblit, S. (1997). Quality assurance procedures at the Open University of Israel. In A. Tait, *Quality Assurance in Distance Education: International Case Studies* (pp. 29-41). Vancouver, Canada: The Commonwealth of Learning.

Hamdan Bin Mohammed Smart University, I. C. (2022). *The Benchmarking Framework for Online, Open, Smart, and Technology-Enhanced Higher Education*. The Benchmarking Framework. https://benchmarking.hbmsu.ac.ae/

Horn, M. (2021). *A New Accountability Model for Alternative K-12 Schools.* American Enterprise Institute: https://files.eric.ed.gov/fulltext/ED616583.pdf

International Accreditors for Continuing Education and Training. (n.d.). *International Accreditors for Continuing Education and Training*. International Accreditors for Continuing Education and Training. https://www.iacet.org/

International Council for Open and Distance Education. (2020). *Knowledge Center*. International Council for Open and Distance Education. https://www.icde.org/knowledge-centre/

International Network for Quality Assurance Agencies in Higher Education. (2022). *International Network for Quality Assurance Agencies in Higher Education*. International Network for Quality Assurance Agencies in Higher Education. https://www.inqaahe.org/

Leahy, M., Thielsen, V., Millington, M., Austin, B., & Fleming, A. (2009). Quality assurance and program evaluation: Terms, models, and applications. *Journal of Rehabilitation Administration, 33*(2), 69-82. https://digitalcommons.usu.edu/sped_facpub/201/

Learning Forward. (2022). *Standards for professional learning*. Learning Forward.https://standards.learningforward.org/

Manitoba Remote Learning Support Centre. (2020). *Manitoba Remote Learning Framework.* Manitoba Remote Learning Support Centre. https://www.mbremotelearning.ca/_files/ugd/d14545_682a66230aa24fa29bcebb8a8c7630a0.pdf

Marshall, S. (2007). *Report on the E-Learning Maturity Model Version 2.3 Capability Assessment of 2 University of the South Pole. Confidential Report.* http://e-learning.geek.nz/emm/documents/example/20071115_2.3_Detail_Report_USP_Core.pdf

Martin, F., Polly, D., Jokiaho, A., & May, B. (2017). Global standards for enhancing quality in online learning. *Quarterly Review of Distance Education, 18*(2), 1-10.

Moon, B., Leach, J., & Stevens, M. (2005). *Designing open and distance learning for teacher education in Sub-Saharan Africa: A toolkit for educators and planners.* World Bank. http://oro.open.ac.uk/8401/1/teacher_education_toolkit_may13.pdf

Morville, P. (2004). *Users' Experience Honeycomb*. Dane Wesolko.com. https://danewesolko.medium.com/peter-morvilles-user-experience-honeycomb-904c383b6886

Online Learning Consortium. (2020). *OSCQR Course Design Review.* OLC Quality Scorecards Suite. https://to.onlinelearningconsortium.org/qs-oscqr/

Open University of Israel. (n.d.). *Facts and Figures*. Open University of Israel. https://www.openu.ac.il/en/about/pages/facts.aspx

Perraton, H. (Ed.). (1993). *Distance education for teacher training.* Routledge Press.

QA Commons. (n.d.). *Employability Framework*. QA Commons. https://theqacommons.org/

Quality Matters. (2020). *Emergency Remote Instruction Checklists.* Quality Matters. https://www.qualitymatters.org/qa-resources/resource-center/articles-resources/ERI-Checklist

Quality Matters, Virtual Leadership Alliance, and Digital Learning Collaborative. (2023). *National Standards for Quality Online Learning*. National Standards for Quality. https://www.nsqol.org/

Quality Matters, Virtual Learning Leadership Alliance, and Digital Learning Collaborative. (2022).

*National Standards for Quality Online Programs*. National Standards for Quality Online Programs. https://www.nsqol.org/the-standards/quality-online-programs/

Quan-Baffour, K., & Akwasi, A. (2018). Quality assurance through experiential learning in a distance education context: The views of major stakeholders. *Turkish Online Journal of Distance Education, 19*(3), 15-23. https://doi.org/10.17718/tojde.444607

Quesenberry, W. (n.d.). *WQ Usability*. Using the 5Es to understand users. https://www.wqusability.com/articles/getting-started.html

Reid, K., & Kleinhenz , E. (2015). *Supporting teacher development: Literature review.* Camberwell, Australia: Australian Council for Educational Research.

Santally, M. (2016). An Evaluation of the African Leadership in ICT Programme from a Quality Assurance Perspective. *European Journal of Open, Distance and E-learning, 19*(2), 114-128. https://files.eric.ed.gov/fulltext/EJ1138166.pdf

Southern Regional Education Board. (2016). *Standards for Online Professional Development.* Southern Regional Education Board. https://www.sreb.org/sites/main/files/file-attachments/04t04-standards_online_prof_dev.pdf

United Nations Educational, Scientific and Cultural Organization Insititute for Lifelong Learning; Commonwealth of Learning. (2021). *Guidelines on open and distance learning for youth and adult literacy.* Hamburg, Germany and Burnaby, British Columbia, Canada: UNESCO Insititute for Lifelong Learning and Commonwealth of Learning.

United States Department of Labor. (n.d.). *Consumer Price Index Inflation Calculator*. U.S. Bureau of Labor Statistics. https://www.bls.gov/data/inflation_calculator.htm

Van Nostrand, P., Noakes, S., Shah, Z., & Luna, L. (2022, February). *An overlooked indicator of edtech quality: The use of learning sciences research.* Digital Promise. https://doi.org/10.51388/20.500.12265/150

Western University. (2018). *eLearning Toolkit*. Western University. https://elearningtoolkit.uwo.ca/

Zuhairi, A., Raymundo, M., & Mir, K. (2020). Implementing quality assurance system for open and distance learning in three Asian open universities: Philippines, Indonesia and Pakistan. *Asian Association of Open Universities Journal, 15*(3), 297-320. https://doi.org/10.1108/AAOUJ-05-2020-0034

Section II. Chapter 20

# TECHNOLOGY

## **Best Practice:** Technology should not drive educational decisions regarding distance education—rather, technology should support educational decisions.

This guide comes full circle with a concluding discussion of technology. Within this second section of *Distance Education for Teacher Training: Modes, Models and Methods*, technology has deliberately been placed as the *last* consideration because too often in the design of distance education programs it is—wrongly—the *only* consideration. Ministries of education or educators often start with the mode of distance education—and too often that mode is online learning, for which many education systems are ill-equipped.

Teaching and learning in a distance environment are mediated by and delivered through technology. Obviously then, the availability of technology and the condition of technology infrastructure are critical considerations in the design of any distance education program. The technology selected for distance learning must build on a country's:

- available communications, networked or broadcast infrastructure;
- available technology equipment;
- physical infrastructure;
- human capital—skilled content developers, instructional designers, and instructors who can work within that particular distance education platform; and,
- distance-technology–specific assessment systems.

Yet while technology can accelerate and expand the reach of distance learning, it cannot be the sole driver of a distance education program.

The research on distance education is clear. Distance programs should be designed with the needs and learning goals of educational institutions and teachers in mind. Where infrastructural choices *do* exist, distance education programs should privilege the purposes and desired outcomes of the distance learning experience over the type of technology.

Inappropriate decisions regarding whether to use technology and what type to use are costly and impede the quality of distance education offerings. In supporting teaching and learning in a distance education environment, the choice and use of technologies for distance education programs should be guided by multiple factors, as listed here.

**1. The distance technology should support, not define, the goals of the distance program.** Distance learning programs should *not* start with the question, "How can we teach teachers using online learning?" Rather, the first question should be, "What should teachers know and be able to do as a result of this instructional program?" The second question should be, "How best can we do this: in-person, via distance, or both?"

**2. Technology should focus on promoting desired learning outcomes.** The technology or technologies selected must be appropriate for curriculum delivery and must support teacher effectiveness. Initial development of distance learning programs should begin with two fundamental questions: What instructional activities and experiences will best help teachers attain the desired learning outcomes? How will distance programs ascertain that teachers have attained these learning outcomes? Neither of these questions have anything to do with hardware, software, or connectivity—nor should they. But the technologies selected must facilitate the desired type of learning.

**3. Technology should support best practices in instruction.** The technology or technologies selected must support best practices in learning: learner-centered instruction, interactivity with content and people, communication, collaboration, reflection, accessing and constructing information in multiple formats, exposure to new opportunities and practices, and assessment (Mayer, 2009; Quality Matters, Virtual Learning Leadership Alliance, and Digital Learning Collaborative, 2022; Tausin & Stannard, 2018; Trucano et al., 2007).

**4. Distance education planners should choose the appropriate distance mode or modes that address the above points.** Once the above goals and learning outcomes have been defined and instructional and assessment activities mapped out, policymakers and planners should consider the mode of distance education that can best help teachers attain the necessary knowledge and skills and that best address the needs and goals of the teachers whom the distance education program is designed to serve. As seen throughout Section I of this guide, the platform chosen will largely drive the type of learning that occurs. This is why conversations about learning should precede conversations about technology.

**5. Distance education programs should be designed with an eye to the future.** Modern technologies offer options to expand educational opportunities and improve educational quality. In selecting, designing, and procuring technologies, no entity should begin planning a distance education program without thinking carefully about the convergence of technologies, trends in technology (hardware, software, types of computing, use, and digital content) and technology-based learning; how these developments cumulatively affect teacher training programs; and the resources needed to maintain a technology system. This is not to suggest that programs should jump on the latest "bleeding edge" technologies; indeed, the hyperbole, the high costs endemic to modern technologies, and often disappointing results should inoculate against impulse buying of the newest, sexiest applications. Rather distance education administrators and designers should be wary of myopia and cognizant of recent technology developments and trends; be familiar with research and best practices about distance education; recognize technology's successes and failures; comprehend distance education's *total cost of ownership* (TCO); and balance the impulse to embrace or reject technologies simply because they are new or old.

**6. The technology used must include backup and support.** Technology breaks down. When computers lie unused because of unavailable tech support, when television broadcasting ceases because of storm damage to a broadcast tower or satellite dish, when interactive radio instruction (IRI) broadcasts stop because of broken radios, then education and professional development efforts are lost and money is wasted (Gaible & Burns, 2007). Any technology-based distance education system must plan for such contingencies and eventualities.

**7. Distance education programs must be designed with equity in mind.** As the world learned during COVID-19 school lockdowns, distance education—online learning in particular—proved to be more exclusive than inclusive (Burns, 2020). Yet there are ways to make distance education more equitable. Online programs should be designed in local languages, according to Web Accessibility Guidelines, with the needs of low-bandwidth learners in mind, with activities and content that are respectful to gender and that are inclusive, and with situations and content that are local, authentic, and relevant. Distance providers must ensure that traditionally marginalized groups—women; racial, ethnic, and religious minorities; poorer teachers; rural teachers; and learners with disabilities—are able to participate and succeed in any distance learning offering.

**8. Distance education programs must be designed with ease of use in mind.** Different distance technologies require different technical skills and dispositions on the part of potential users. The existing skills and readiness of distance instructors and learners are critical considerations in selecting a particular mode of distance education delivery. The technology identified must be easy enough for instructors and learners to use so that technology—and difficulties operating it—do not obscure the focus on teaching and learning. The use of any technology will obviously and necessarily involve some form of technology training. But fluent technology skills do not guarantee fluency in teaching and learning with technology (Burns, in press). Any distance learning program must devote less time and effort and fewer resources to teaching *about* technology and more time, effort, and resources to helping its instructors and learners teach and learn *with and through* technology.

**9. Distance education programs that think big should start small.** Distance education programs can scale learning—an intended aim of many distance education programs. These ambitions aside, distance programs should start small—focusing on getting the basics of their programs right. This includes, for example, making sure instructors and teachers know how to use the technology, that all content loads over different bandwidth speeds, that the course works on various types of devices and that there is necessary technical documentation to support those who will take over the running of courses. This is where a series of small well-developed and well-evaluated pilots—"user tests" or "dry runs"—of the course before it is fully launched will help. As discussed in *Chapter 11: Instructional Design*, pilots simulate the presence of the material in the same platform in which it will be hosted so that any problems can be identified, fixed, and debugged before the course is fully launched (Burns, 2019). By starting small, distance course designers can identify what can and cannot work with a larger number of learners and revise accordingly so courses can be scaled or franchised.

**10. Distance education programs must remember that distance education is not just about technology.** It is about people—designers, subject matter experts, assessors, instructors, and learners. It is about education—improving the knowledge, skills, attitudes, aptitudes, and values of *teachers,* with the ultimate aim of improving the learning and achievement of the *students* of today and tomorrow. The mortar that binds these elements together is a focus on quality—ensuring that every input, outcome, and action (instruction, content, assessment) is designed, disseminated, created, communicated, measured, and focused on the highest levels of quality.

## 20.1 Conclusion

To help teachers develop the characteristics of good teaching outlined in Chapter 8, distance education programs will have to provide teachers with ongoing opportunities to improve their content knowledge, instruction and assessment skills, knowledge about how students learn, and understanding of learning from a student point of view. To succeed in this endeavor, careful design of distance learning programs will require grounding in what we know to be best practices in teaching and learning: content that is linked to teachers' everyday classroom practice, and distance instruction that focuses on promoting high-quality teaching. Quality distance education must provide ongoing professional development that is based on proven best practices; offers continual support; and helps teachers become not just a community of learners but a community of practitioners. Distance learning programs must prepare their instructors, coaches and mentors, and learners to succeed in a distance environment through orientation, preparation, support, and leadership.

All components of distance learning programs must be designed according to quality standards so that courses and learning experiences are developed, teachers assessed, programs evaluated, and quality assured by measurement against these standards. Distance learning programs must formatively and summatively assess instructors and teacher-learners so that both can receive help as needed. Distance learning designers must integrate rigorous evaluation into program design so that programmatic and contextual factors can be addressed and remedied if needed. These components should not be used in isolation, nor are they *à la carte* options. All must be incorporated into a coherent distance education system.

The inputs and activities outlined in this guide are ambitious, because improving teacher quality is ambitious. Many distance education programs have approached the task of improving teacher quality with too much complacency and too little ambition and have little to show for it as a result. Other programs have focused too much on careful attention to technology inputs and infrastructure and not enough on human inputs and human infrastructure. Many distance programs focus on brevity, entertainment, and engagement as their North Star, instead of rigorous and high-quality learning. Consequently—although not surprisingly—there is often little measurable improvement in the knowledge and skills of their teacher graduates.

No education system is measured by the quantity and quality of its technology but rather by the quality of its *learning* and of its *teachers and students*. This guide has outlined the inputs and activities necessary to create a high-quality distance education system that increases the probability of producing high-quality teachers. It is our hope that the global education system will not again be caught as unaware and unprepared as it was in March 2020, when schools across the planet abruptly closed *en masse* and where wealthy countries with well-developed distance-based systems were able to ensure high-quality continued education while in the poorest countries children had no opportunities for learning (United Nations Educational, Scientific and Cultural Organization, 2022). Rather, our aspiration is that this guide will be understood as a call to action to change what is required to improve distance education so it truly can provide quality and equitable learning for teachers and their students, wherever they may live.

Citation: Burns, M. (2023). Technology. In *Distance Education for Teacher Training: Modes, Models and Methods.* (2nd Edition). Washington, DC: Education Development Center.

## References

Burns, M. (2019, February 15). Yes, You Should Pilot Your Online Course: A Few Things To Consider As You Do. *eLearning Industry*. https://elearningindustry.com/pilot-your-online-course-things-consider

Burns, M. (2020, June 10). *Online education's COVID-19 struggles*. UKFIET-The Education and Development Forum. https://www.ukfiet.org/2020/online-educations-covid-19-struggles/

Burns, M. (in press). *Barriers and supports for technology integration: Views from teachers. Background chapter prepared for the global education monitoring report: Technology and education.* United Nations Educational, Scientific and Cultural Organization.

Gaible, E., & Burns, M. (2007). *Using technology to train teachers: Appropriate uses of ICT for teacher professional development in developing countries.* InfoDev | World Bank. https://documents1.worldbank.org/curated/en/900291468324835987/pdf/396180infoDev01IN0TEACHERS01PUBLIC1.pdf

Mayer, R. (2009). *Multimedia learning* (2nd. ed.). Cambridge University Press.

Quality Matters, Virtual Learning Leadership Alliance, and Digital Learning Collaborative. (2022). *National standards for quality online programs*. https://www.nsqol.org/the-standards/quality-online-programs/

Tausin, M., & Stannard, L. (2018). *EdTech for learning in emergencies and displaced settings: A rigorous review and narrative synthesis.* Save the Children. https://resourcentre.savethechildren.net/library/edtech-learning-emergencies-and-displaced-settings-rigorous-review-and-narrative-synthesis

Trucano, M., Farrell, G., & Isaacs, S. (2007). *Survey of ICT and education in Africa: A summary report based on 53 country surveys.* Commonwealth of Learning. http://hdl.handle.net/11599/247

United Nations Educational, Scientific and Cultural Organization. (2022, October). *Transforming education from within: Current trends in the status and development of teachers. World Teachers Day.* UNESDOC Digital Library. https://unesdoc.unesco.org/ark:/48223/pf0000383002

Section III.

# APPENDICES:
# LISTS AND GLOSSARY OF TERMS

## Appendix 1: List of Countries and Territories Referenced in This Guide

Listed by official names (188 nations and territories)

Afghanistan
Anguilla (UK)
Antigua and Barbuda
Arab Republic of Egypt
Argentine Republic
Barbados
Belize
Bolivarian Republic of Venezuela
Bosnia and Herzegovina
British Virgin Islands
Burkina Faso
Canary Islands (Spain)
Cayman Islands (UK)
Central African Republic
Commonwealth of Australia
Commonwealth of Dominica
Commonwealth of Puerto Rico (USA)
Commonwealth of The Bahamas
Cooperative Republic of Guyana
Country of Aruba
Country of Curaçao
Crown Colony of Montserrat
Czech Republic
Democratic Republic of São Tomé e Principé
Democratic Republic of the Congo (DRC)
Democratic Socialist Republic of Sri Lanka
Dominican Republic
Dominion of Canada
Federal Democratic Republic of Nepal
Federal Republic of Germany
Federal Republic of Nigeria
Federal Republic of Somalia
Federated States of Micronesia
Federation of Malaysia
Federation of Saint Kitts and Nevis
Federative Republic of Brazil
French Republic (France)
Grand Duchy of Luxembourg
Grenada
Hashemite Kingdom of Jordan
Hong Kong Special Administrative Region of the People's Republic of China
Hungary
Independent State of Papua New Guinea
Independent State of Samoa
Islamic Republic of Mauritania
Italian Republic (Italy)
Jamaica
Japan
Kalaallit Nunaat (Greenland)
Kingdom of Belgium
Kingdom of Bhutan
Kingdom of Cambodia
Kingdom of Denmark
Kingdom of Eswatini (Swaziland)
Kingdom of Lesotho
Kingdom of Morocco
Kingdom of Netherlands
Kingdom of Norway
Kingdom of Saudi Arabia
Kingdom of Spain
Kingdom of Sweden
Kingdom of Thailand
Kingdom of Tonga
Kyrgyz Republic
Lao People's Democratic Republic
Lebanese Republic (Lebanon)
Oriental Republic of Uruguay
People's Republic of Bangladesh
People's Republic of China
People's Republic of Montenegro
Plurinational State of Bolivia
Portuguese Republic (Portugal)
Principality of Andorra
Principality of Liechtenstein
Republic of Albania
Republic of Angola
Republic of Armenia
Republic of Austria
Republic of Azerbaijan
Republic of Belarus
Republic of Benin
Republic of Botswana
Republic of Bulgaria
Republic of Burundi
Republic of Cabo Verde
Republic of Cameroon
Republic of Chad
Republic of Chile
Republic of China (Taiwan)
Republic of Colombia
Republic of Costa Rica
Republic of Côte d'Ivoire
Republic of Croatia
Republic of Cuba
Republic of Cyprus
Republic of Djibouti
Republic of Ecuador
Republic of El Salvador
Republic of Estonia
Republic of Ethiopia
Republic of Fiji
Republic of Finland
Republic of Georgia
Republic of Ghana
Republic of Guatemala
Republic of Guinea
Republic of Guinea-Bissau
Republic of Haiti
Republic of Honduras
Republic of Iceland
Republic of India
Republic of Indonesia
Republic of Iraq
Republic of Ireland
Republic of Kazakhstan
Republic of Kenya
Republic of Kiribati
Republic of Korea (South Korea)
Republic of Kosovo
Republic of Latvia
Republic of Liberia
Republic of Lithuania
Republic of Madagascar
Republic of Malawi
Republic of Maldives

Republic of Mali
Republic of Malta
Republic of Mauritius
Republic of Moldova
Republic of Mozambique
Republic of Namibia
Republic of Nauru
Republic of Nicaragua
Republic of North Macedonia
Republic of Panamá
Republic of Paraguay
Republic of Perú
Republic of Poland
Republic of Rwanda
Republic of San Marino
Republic of Senegal
Republic of Serbia
Republic of Seychelles
Republic of Sierra Leone
Republic of Singapore
Republic of Slovenia
Republic of South Africa
Republic of South Sudan
Republic of Suriname
Republic of Tajikistan
Republic of the Gambia
Republic of the Niger
Republic of the Philippines
Republic of the Sudan
Republic of the Union of Myanmar
Republic of Trinidad and Tobago
Republic of Turkiye (Turkey)
Republic of Uganda
Republic of Vanuatu
Republic of Yemen
Republic of Zambia
Republic of Zimbabwe
Romania
Russian Federation
Saint Lucia
Saint Vincent and the Grenadines
Sint Maarten (Kingdom of the Netherlands)
Slovak Republic
Socialist Republic of Vietnam
Solomon Islands
State of Israel
State of Kuwait
State of Libya
State of Palestine
State of Qatar
Swiss Confederation (Switzerland)
Syrian Arab Republic
Togolese Republic
Tuvalu
Ukraine
Union of the Comoros
United Arab Emirates
United Kingdom of Great Britain and Northern Ireland
United Mexican States (México)
United Republic of Tanzania
United States of America
Uzbekistan
Vatican City State (The Holy See)
Virgin Islands of the United States
Zanzibar

## Appendix 2: Glossary of Terms Used in This Guide

Accessible  Materials, technology, and learning experiences that individuals with auditory, visual, or motor disabilities can use, understand, interact with, and learn from to the same degree as individuals with no disabilities.

Accreditation  The systematic assessment of a program or institution in meeting certain standards. Accreditation is typically voluntary and involves a rigorous external, peer, and self-assessment process. Once programs or institutions meet or exceed all standards and evaluation criteria, they are accredited by an accrediting agency (such as the Distance Education Accrediting Commission [DEAC] or the National Council for Accreditation of Teacher Education [NCATE]), which provides official recognition of excellence. At the program level, accreditation focuses on the quality of a specific program or course of study. At the institutional level, accreditation focuses on the quality of the entire institution. Accrediting agencies can be international, national, or regional.

Acoustic treatments  Actions, activities, or "treatments" to reduce the amount of diffuse noise to improve the signal and acoustic quality of a space. Acoustic treatments attempt to reduce:

- *reflection* (sound waves reflecting or bouncing off other surfaces in their path, potentially being deflected from their target destination);
- *reverberation* (multiple sound waves bouncing off of surfaces and combining to create an "echoey" sound); and,
- *resonance* (when one object vibrating at the same natural frequency of a second object forces that second object into vibrational motion, it can cause loud, distorted sounds, sometimes causing feedback in sound systems).

Acoustic treatments to address such issues might include double glass glazing on windows, rugs on hard floors, putting tapestries on opposite facing walls, or substituting wood tables for metal ones (Illuminated Integration, 2020).

Active learning  A broad variety of strategies or pedagogical approaches designed to place the primary responsibility for creating and/or applying knowledge on the learner. Active learning is also known as "child-centered," "interactive," "student-centered," or "learner-centered" instruction.

Analog technology  Any technology that is not digital. Examples include many types of radio and television, as well as audiocassette players. These devices record sounds of different frequency and amplitude on magnetic tape.

Application Programming Interface (API)
A small software program that allows one software program to interact with another. Thanks to APIs (e.g., Google *Chrome Extensions* that increase the functionality of a Google document), online learning has increasingly incorporated more interactive, browser-based learning activities. APIs don't work only with browsers. They can allow for interoperability among platforms and software applications, for example, an LMS pushing out grades to a school's existing student information system or *Zoom* working within an LMS (Burns, 2021).

Applications ("apps")  A type of computer software program that performs a specific function. Apps can run on smart phones, tablets, or any other portable electronic device.

Artificial Intelligence (AI)  The branch of computer science dealing with the reproduction or mimicking of human-level thought in computers. Encompassing cognitive science, mathematics, and computational linguistics, AI breaks down human knowledge into a number of topics—reasoning, knowledge, planning, learning, communication, perception, and the ability to move and manipulate objects—and attempts to imitate these through the use of algorithms.

AI uses a multitude of approaches. Classical—or rules-based—AI uses rules of conditional logic (e.g., *if...then* statements) and has been used for decades to power educational applications (Pelletier et al., 2021, p. 7). Increasingly, AI uses computational approaches such as machine learning, deep learning, natural language processing, and artificial neural networks to build models that predict future values, find patterns, mimic human speech, and automate a variety of tasks (Miao et al., 2021).

Asynchronous learning  This involves individuals learning at different times and in different places. Learners work on their own without live interaction with others. This may include interactions via communication tools that involve a time lag, such as email, bulletin boards, or discussion forums.

Augmented Reality (AR)  A live, direct, or indirect view of a physical, real-world environment whose elements are *augmented* by computer-generated sensory input, such as sound, graphics, or Global Positioning System (GPS).

Avatar  A computer user's representation of himself/herself or of an alter ego, whether in the form of a three-dimensional model used in computer games or a two-dimensional icon (picture). An avatar also can refer to the personality connected with the screen name, or "handle," of an Internet user.

Backward design  Also known as Understanding by Design (UbD), backward design is an instructional design approach developed by Grant Wiggins and Jay McTighe (2005). A three-stage process, *backward design* begins with the end, or goal, in mind: What should learners know or be able to do as a result of learning a certain unit? The second stage focuses on assessment: How will the instructor know that learners have attained instructional goals? The third stage focuses on planning for instruction: What kinds of activities, experiences, materials, and tools should the instructor design so that she or he can assess for understanding of learning goals? (Wiggins & McTighe, 2005).

Bandwidth  The range of frequencies that can pass over a given transmission channel, determining the rate at which information can be transmitted through the circuit. The greater the bandwidth, the more information that can be sent in a given amount of time. Bandwidth typically is measured in *bits per second*. A *bit* ("binary" + "digit") is a unit of measurement of information. There are eight bits in a byte. Bandwidth ranges from 56kbit/second ("dial-up") to 100 Gbit/second (100 Gigabit Ethernet) (Gartner, 2023).

Bichronous  A combination of asynchronous and synchronous online delivery methods. Learners participate in anytime, anywhere learning during the asynchronous parts of the course. They then participate in real-time activities for the synchronous sessions. The amount of online learning varies by the course and the activities included in the course (Martin et al., 2020).

Blended learning  An instructional approach that integrates both face-to-face and online learning in the delivery of course or educational materials. It is a pedagogical approach where classes or learning environments provide an integrated mix of traditional face-to-face instruction and Web-based online learning.

An array of technologies can be used to support this methodology, but it often involves an online content provider (such as Khan Academy) and a learning management system (LMS) to "manage the learning across the two environments" (Goff, 2017, p. 6). Blended learning is evolving from its synonymity with "hybrid learning"—increasingly referring more to the organization of learning with and without technology as part of a formal educational experience.

Blockchain  A distributed database or ledger shared among the nodes of a computer network. A blockchain collects information together in digital "blocks" that hold sets of information and that have certain storage capacities. When this capacity is reached, the block is closed and linked to the previously filled block, forming the "chain" of data. Blockchains are best known for their crucial role in cryptocurrency systems, such as Bitcoin, for maintaining a secure and decentralized record of transactions, and for guaranteeing the fidelity and security of a record of data. Thus, blockchains generate trust without the need for a trusted third party (Hayes et al., 2022).

Blog (from "Web log") A publicly accessible journal that is kept online and allows for others' comments. The blog owner may choose to identify himself or herself or to write anonymously.

Bluetooth A wireless protocol for exchanging data over short distances among cell phones, headsets, computers, and other electronic devices.

Broadband A range of frequencies wider than that required for voice communications. Broadband is also a term used to describe systems and equipment with high bandwidth that can carry these frequency ranges.

Bulletin board An online space where users can post information and resources and communicate with others. It is an asynchronous technology.

Cable television A television subscription service in which the signal is distributed via a cable, versus broadcasting or satellite transmission. Cable carries a much larger number of channels. Increasingly, cable television viewers can interact with the distribution center or with content through downloadable apps, websites, and television features.

Chat A piece of software, such as Facebook's *Messenger, WhatsApp*, or *iChat,* which allows users to communicate synchronously (at the same time) with people who also are online and logged into the same "chat" software.

Chatbot A chatbot is a software application designed to mimic conversation with users. There are multiple types of chatbots: rules-based chatbots, menu-based, keyword based, voice-based, conversational chatbots powered by machine learning and Artificial Intelligence (AI), and hybrid chatbots which are developed using AI and non-AI features (Engati, 2023).

Choiceboard Web-based files, typically organized in a nine-square grid, that usually start with a specific learning goal, then provide learners with a variety of ways they can choose to learn about a particular topic, practice a skill, or demonstrate understanding. They can be created in Microsoft *Word* or Google *Docs*, Microsoft *Excel* or Google *Sheets*, or presentation software.

Chromebook A notebook computer lacking a hard drive that runs Google *Chrome's* operating system and Google applications. All content is stored in and accessed via the Internet (the "cloud").

Cloud computing Internet-based computing in which applications are stored not on the computer's hard drive but on servers (the cloud), so that users can access them as needed without paying for a software license or devoting computer storage space to house them. Web 2.0 applications are examples of cloud-based applications and cloud computing.

Coding For *computing*, coding is the use of a particular programming language to make a computer application perform a desired function. Each line of the code is a set of instructions for the computer. A set of codes form a script, and a script or dozens of scripts form a computer program (Khatri, 2023).

For *qualitative research*, coding is the process of assigning descriptors to a particular statement, behavior, or attitude (referred to here as a *variable*) in a narrative text, audio, or video for the purposes of classification. In *inductive* or *open* coding, an evaluator assigns a code to a variable and then combines variables to enumerate the number of occurrences of a code or related set of codes to identify a theme. This is part of "grounded," or inductive, research. *Deductive* or *theoretical* coding involves identifying codes derived from the overall philosophical framework or hypothesis of the qualitative design and is used to confirm a hypothesis. *Hybrid* coding combines the use of inductive and deductive coding. Coding can be done by hand or, more commonly, through qualitative research software such as *NVivo* or *Dedoose*.

Compact Disc (CD) An optical disc used to store digital data, such as digital audio and video. A CD-ROM ("compact disc read-only memory") is readable by either a computer with a CD-ROM drive or by CD players.

Compression Any of several techniques that reduce the number of bits required to represent information in data transmission or storage, allowing for conservation of bandwidth and memory and thus faster transmission, downloading, and uploading times. *WinZip* is an example of a compression application.

Computer-Aided Instruction (CAI)/Computer-Aided Learning (CAL) Instruction delivered by a computer. The computer acts as a teacher and presents content and problem sets with which the learner interacts. CAI programs vary greatly in quality. Some programs are behaviorist, drill-based applications, while others are more constructivist in their design, offering more iterative problem sets and feedback to address specific learner weaknesses adjusted by the computer.

Computer Assisted Telephone Interviewing (CATI) A common research and marketing practice in which interviewers conduct telephone-type surveys through a special kind of software on a computer or mobile device. The software loads contact names and numbers and the person making the call uses the software platform, often following prompts or scripts. Data then can be easily entered by the caller and, in the case of some platforms, automatically transcribed via voice-to-text features.

Computer-Mediated Communication (CMC) Any communicative transaction that occurs through the use of two or more networked computers. This can involve the use of email, chat, bulletin boards, discussion forums, or any type of one- or two-way communication occurring over a computer via a network.

Connectivism Also known as connectivist learning, connectivism is grounded in the idea that learning is not simply the domain of individuals but occurs within and across digital networks.

Connectivity The technological capacity that specifically allows computers and other electronic devices to communicate with one another, particularly in relation to telecommunications technologies such as email, the Internet, and chat.

Constructivism A learning theory that has its roots in a number of disciplines—philosophy, anthropology, the natural sciences, semiotics, sociolinguistics, and education. The central idea of constructivism is that knowledge is not fixed, but rather is constructed by the learner. Some of the other major concepts of constructivism are that learners bring unique, prior understandings to any learning situation; learning is an adaptive activity; learning is situated and contextual; learners may resist, accommodate, or assimilate new learning; and that people learn by interacting with materials, resources, experiences, and other people (Boethel & Dimock, 1999; Dimock et al., 2001). The instructional offspring of constructivist learning theory is learner-centered, student-centered, child-centered instruction or active learning.

Content management system (CMS) A Web-based application used to collect, manage, edit, and publish Web-based content such as text, image, video, or any other form of media—for example, *WordPress*, *Drupal*, or *Sitecore*.

Course management system (CMS) See *Learning Management System*.

Creative Commons An American nonprofit organization and international network focused on overcoming the legal obstacles to the sharing of knowledge and creativity. It does this primarily by offering creators a choice of six licensing types for granting the public permission to freely use work under copyright laws (Creative Commons, n.d.).

Criterion-referenced assessment A measure of a learner's performance against a predetermined set of standards (criteria).

Data dashboard A display of small pieces of distinct types of visual data such as gauges, charts, and tables within a Web browser. The concept is similar to the information provided by a car's dashboard. Popular data dashboards include *Power BI*, *BrightBytes*, and *Redash*.

Digital game A game played by manipulating some form of electronic media (e.g., game console, cell phone, computer). Web-based digital games can be played across media, time, and social spaces.

Digital learning game Unlike entertainment games, this is a type of game that targets the acquisition of knowledge in a particular domain or set of domains and habits of mind—creativity, problem solving, conative skills, inquiry, distributed cognition, and heuristic methods—across all academic content areas (Klopfer et al., 2009).

Digital rights management Protection of copyrighted digital content to prevent unauthorized viewing, copying, or distribution.

Discussion forum An online or virtual message board where users post materials, comments, ideas, and so on. Discussion boards are part of most learning management systems and are typically asynchronous.

Distance education An educational process and system in which all or a considerable proportion of the teaching is carried out by someone or something removed in space and time from the learner. Distance education requires structured planning, well-designed courses, special instructional techniques, and methods of communication by electronic and other technologies, as well as specific organizational and administrative arrangements (UNESCO & UNEVOC, 2017; Keegan, 1996).

Distance learning A system and process that connects learners to distributed learning resources. Distance learning can take a variety of forms, but all distance learning is characterized by (1) separation/distance of place and/or time between instructor and learner, among learners, and/or between learners and learning resources; and (2) interaction between the learner and the instructor, among learners, and/or between learners and learning resources conducted through one or more media (Keegan, 1996; UNESCO & UNEVOC, 2017).

Dual-mode institution Traditionally, an institution of higher education in which teaching, learning, and administrative systems support both campus-based and distance-based education. The Distance Education Centre at the University of the West Indies (UWIDEC), which has physical campuses in Caribbean islands of Trinidad, Jamaica, Antigua and Barbuda, and Barbados (now called the "Open Campus of UWI"), was one such model of a dual-mode institution. The term is quickly giving way to "hybrid" as universities increasingly offer both in-person and online degree programs.

Digital Video Disc/Digital Versatile Disc (DVD) An optical disc storage media format that can be used for data storage—for example, of movies with high video and sound quality. DVDs resemble CDs in terms of physical dimensions, but they can store much more data than CDs.

Digital Video Recorder (DVR) A device or program that records television programs as they are broadcast and stores them for replay later. They may be set-top boxes, computer-based, or a feature that is integrated into the television itself.

Education management information system (EMIS) A computer-based system of hardware and software (and people) that allows institutions to store, search, and retrieve data in order to make educational decisions about enrollment, resources, cost, and so on. An EMIS is typically a database program. There are numerous variations of EMIS—for instance, a student information system (SIS).

Educational television  Noncommercial television that provides programs, especially of an educational nature, for the public. Its programming emphasizes formal classroom instruction and enrichment, in contrast to commercial television, which generally focuses on entertainment. *Sesame Street* and *Ubongo Kids* are examples of educational television programming for children.

Effect size  An effect size specifies the number of standard deviation (SD) units separating the outcome scores of treatment and control groups in a study. They are expressed as the standardized mean difference (SMD), interpreted as the magnitude of the number of SD changes in the outcome for the intervention group versus the comparison group. They can therefore be used to express results from different studies on a single uniform scale of effectiveness and may be positive or negative. Effect sizes can be calculated from the means and SDs for two or more groups or on the basis of information provided in statistical tests, such as *t*-tests and analyses of variance (Means et al., 2009, pp. xiii, 14). An effect size is positive when a treatment group in a study outperforms the control group; it is negative when the control group outperforms the treatment group. Effect sizes of around 0.2 are typically considered to be small; 0.5, moderate; and 0.8, large in size. Effect sizes above 0.25 are considered large enough to be educationally meaningful (Cohen, 1988; Slavin, 1990). These guidelines are only broad generalizations, however, covering many types of interventions, target populations, and outcome measures (Hill et al. 2008).

eLearning  A very broad term with no actual consensus as to its meaning. "E" refers to the format. "Learning" is the content, activities, or course of study with which learners engage to attain educational goals. ELearning may refer to formal online learning, or any kind of Web-based learning, or any technology-based learning, whether online or offline.

Electronic mail (email)  A method of composing, sending, and receiving messages via the Internet. Email is an asynchronous form of communication.

e-reader  An electronic reader, such as the *Kindle* or *Nook*, that allows users to read, bookmark, annotate, purchase, and store hundreds of books in a digital format. Text is displayed via *electronic ink* (e-ink), a technology designed to mimic the appearance of ordinary ink on paper. It is used in e-readers because e-ink displays don't drain batteries as much as backlit-screen devices do, and thus extend battery life.

Experimental design  An evaluation design in which participants are randomly assigned to treatment and control groups. Experimental designs are considered rigorous because random selection can minimize the confounding effects of other variables.

Extensible Markup Language (XML)  See *XML*.

Flexible assessment  A form of learner-centered, alternative assessment that gives learners the choice of completing all or some combination of a series of optional assessment items or allows learners to select an assessment option. Flexible assessment can include checklists, portfolios, product assessment, oral or written exams, and computer-based or performance-based assessment. Flexible assessment is designed to accommodate the learner's pace, style, and context of learning.

Font families  A set of letter forms with a common design element. There are five font families:

1. Serif fonts have small winged or flared tips, called serifs, extending off the tips of the letters and are typically used in printed materials. An example would be Times New Roman.

2. Sans-serif fonts use characters without serifs and are used for digital formats. An example would be Arial.
3. Cursive fonts use characters that have connective strokes which give the font a handwritten appearance. An example is Comic Sans MS.
4. Fantasy fonts are stylized fonts, such as Cottonwood, that maintain the characteristics of a non-cursive alphabet.
5. Monospace fonts have characters that are all the same width, giving text the appearance of a manual monospaced typewriter. One example would be Courier (MasterClass, 2021).

Formative assessment  Assessment that is ongoing and continual and not used to certify mastery or assign grades. Formative assessment is instructional in nature; it provides information about the learner's progress and understanding of a certain concept or skill.

Formative evaluation  Evaluation that involves periodic or continual monitoring of the progress of a project or its participants. Formative evaluation can be for gathering information, audience research, or program improvement purposes.

Geographic Information System (GIS)  Essentially GIS is a database with mapping capabilities. It is an information system that is used to input, store, retrieve, manipulate, analyze, and visually output geographically referenced data or geospatial data, in order to support decision making for planning and management of land use, natural resources, the environment, transportation, and so on.

Global Positioning System (GPS)  A worldwide radio navigation system formed from a constellation of 31 satellites (as of June, 2022) and their ground stations, that constantly orbit the Earth, making two complete rotations each day. After locating four or more of these satellites, GPS receivers on Earth employ a process of trilateration to calculate the distance to each and then use this information to deduce their own latitude and longitude (GPS.gov, 2022). Many cell phones now include a GPS, and handheld GPS devices can be inexpensively purchased and used for educational activities.

Global System for Mobile Communication (GSM)
The Global System for Mobile Communications (GSM) is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe the protocols for second-generation (2G) digital cellular networks used by mobile devices. Like code-division multiple access (CDMA), it is a second-generation digital mobile cellular technology (Telephone World, 2021). GSM operates in several frequency bands—900 MHz, 1800 MHz, 850 MHz, and 1900 MHz. The 900 MHz and 1800 MHz GSM frequency bands are used primarily in Europe, the Middle East, Africa, Asia, and Australia, including GSM 900 Primary (P-GSM) and GSM 900 Extended (E-GSM) bands; the 850 MHz and 1900 MHz GSM frequency bands are used mainly in North America and South America (Ghayas, 2019).

Graphical User Interface (GUI)  A type of computer interface that allows the user to interact with icons versus text commands. Windows, Linux, and Apple operating systems are all examples of GUIs. Unix is not.

Hybrid learning  An educational delivery approach that combines face-to-face teaching (educator to learner) with online instruction. Hybrid learning can involve both synchronous and asynchronous content delivery, addressing barriers related to space or place (Penn State University, 2021). Traditional "dual mode" universities, such as Deakin University or the University of Queensland (Australia), were the earliest hybrid universities in that they allowed learners to pursue degrees either on campus ("single-mode") or via distance ("dual-mode") through parallel, though not simultaneous, experiences. True hybrid learning involves much greater integration between on-site and online models of delivery: A learner may enroll in an online class as well as an in-person one and may attend both at the same time.

HyperDoc A digital document that acts as self-contained lesson plans, with all components of the learning cycle pulled together into one central hub connected via hyperlinks. HyperDocs typically support asynchronous learning and often are organized according to the 5E framework: Engage, Explore, Explain, Elaborate, Evaluate. Like Choiceboards, they can be created in *Word* or Google *Docs* or in *PowerPoint* or Google *Slides*.

Immersive digital environments Artificial, interactive, computer-created scenes or worlds within which users can engage or "immerse" themselves in some experience or activity. Immersive digital environments may be thought of as synonymous with virtual reality, but without the implication that actual reality is being simulated. An immersive digital environment could be a model of reality, a complete fantasy user interface or abstraction, or some sort of simulation. Immersive environments are also known as multi-user virtual environments (MUVEs) or virtual worlds. The most well-known example in education is probably *Second Life.*

Information and Communication Technologies (ICT) These are technological tools and resources—hardware, software, peripheral devices—used to find, create, store, display, and communicate information and connect learners to a variety of experiences. They can include "computers, the Internet (websites, blogs and emails), live broadcasting technologies (radio, television and webcasting), recorded broadcasting technologies (podcasting, audio and video players and storage devices) and telephony (fixed or mobile, satellite, video-conferencing)" (UNESCO Institute for Statistics, 2023).

Instant messaging (IM) A form of real-time communication between two or more people, based on typed text. The text is conveyed via devices (desktop, laptop, or handheld computers) connected over a network such as the Internet. IM is also known as "chat" or "SMS," and is often referred to as "texting."

Instructional design The process of creating instructional tools, content, experiences, and activities to help learners attain a specific set of learning goals. Instructional design can occur with or without technology. It consists of diagnosing the needs of the learner; defining the end goals of instruction; determining how learning goals will be assessed and evaluated; and developing interventions, experiences, and activities to assist in the learning transaction.

Instructional strategies Activities that teachers design and the way instruction occurs around such activities (what learners must do and how they must do it) in order to help them attain learning outcomes.

Instructional television A distance education strategy that uses television broadcasts to instruct learners in a particular skill or concept. The medium can be active or passive. *Telesecundaría* (México) is an example of instructional television programming.

Intelligent tutoring system (ITS) A learning technology that is an outgrowth of CAI and dynamically adapts learning content to objectives, needs, and preferences of a learner via a series of algorithms that adapt learning to learner inputs. ITSs are frequently AI-driven.

Interactive audio instruction (IAI) A distance learning method that encompasses a variety of forms of audio instruction for teachers and learners. IAI's methodology blends audio-based lessons, teacher professional development and support materials, and simultaneous instruction for teachers and learners via the audio teacher. It requires teachers and students to react verbally and physically to prompts, commands, questions, and exercises posed by audio characters. Lessons can be delivered via prerecorded CDs or audiotapes (narrowcasting) or via a live radio broadcast.

Interactive learning See Active learning.

Interactive radio instruction (IRI) A one-way distance education system for students and teachers that combines radio broadcasts with active learning techniques. IRI is a subset of IAI.

Interactive television (ITV) Television programs with one-way video transmission, allowing learners to see the instructor at a distance. With the advent of compressed video, ITV programs that allow both students and teachers to see, hear, and respond to each other via video and audio in real time are increasingly common.

Interactive Voice Response (IVR) An automated phone system technology that allows incoming callers to access information via a voice response system of pre-recorded messages without having to speak to a person. The user also can utilize menu options via touch-tone keypad selection or speech recognition to have their call routed to a specific person or department. IVR requires only a basic cell phone and allows for various audio content.

Interactive Whiteboard (IWB) A large digital display board, also known as a "smart board" or "electronic white board," that connects to a computer and projector and then displays the computer's desktop onto the board's surface, where users can control the computer with a pen, their finger, or another device. The board is typically mounted on a wall or floor stand. Various accessories enable additional interactivity, and learners can view games and multimedia applications stored on an instructor's computer and interact with the content either alone or in groups.

In an online environment, "whiteboards" are a different application, though they function in much the same way as a physical IWB. For instance, in webinars or online meetings whiteboards allow participants to simultaneously view one or more users drawing on an on-screen blackboard, presenting information, or running an application from their computers. *Jamboard* is an example of a digital whiteboard.

Internet A network of networks on a worldwide scale through which millions of computers are interconnected via a set of computer protocols.

Internet protocol television (IPTV) A system through which Internet television services are delivered via broadband Internet access networks, rather than through traditional radio frequency broadcast, satellite signal, or cable television formats. IPTV services may be classified into three main groups: (1) live television, with or without interactivity related to the current television program; (2) time-shifted programming, replaying a program that was broadcast hours or days ago or replaying the current program from the beginning; and (3) video on demand (VOD), a catalog of videos not related to television programming, such as streaming services like Netflix or Amazon (Hanna & Scarpati, n.d).

Learner-centered instruction An instructional approach that advocates that learners bring unique prior knowledge, experience, and beliefs to a learning situation; construct knowledge in multiple ways using a variety of authentic tools, resources, experiences, and contexts; learn by interacting socially and collaborating in order to solve real-world problems; and create their own understanding of situations. It views learning as an active and reflective process. See also *constructivism*, *active learning,* and *student-centered learning.*

Learning analytics The measurement, collection, analysis, and reporting of data about learners and their contexts for purposes of understanding and optimizing learning and learning environments, providing early warning to instructors about at-risk learners, providing personalized supports to learners, and improving accountability or product design.

Learning management system (LMS) A digital platform that enables instructors to organize and post course content materials over the Internet for their learners. Examples include *Moodle*, *Canvas*, and *Blackboard*. Also known as a *course management system.*

Learning object A small chunk of information (text, video, audio, an image) delivered over the

Internet that serves as an object of study. Learners and instructional designers can use, reuse, adapt, and save learning objects in a number of different learning contexts.

**Liquid Crystal Display (LCD)** A flat, thin display device typically referring to a type of monitor found in flat-screen displays like those in laptops, tablets, digital watches, and other similar devices. LCDs use liquid crystals to switch pixels on and off to reveal a specific color. They also block light emanating from the back of the screen instead of creating the light themselves. This allows for a better picture quality, support for high resolutions, and the use of less power than was the case with older cathode ray tube displays (Fischer, 2021).

**Massively Multiplayer Online Role-Playing Games (MMORPG)** A video game that takes place in a persistent state world (PSW), with thousands or millions of players developing their characters in a role-playing environment. The virtual world in which the game takes place is immersive and never static. Even when a player is logged off, events are occurring across the world that may impact the player when he or she logs in again. The most popular (as of July 2022) is *World of Warcraft* (Techopedia, 2017).

**Massive Open Online Course (MOOC)** An online course that typically is asynchronous. It is massive in that it can accommodate thousands of learners, and open in that anyone can register and take the course (though there are MOOCs that charge a fee for the course or for certification).

**Media** Means and ways of distribution and communication—from text, audio, graphics, and animated graphics to full-motion video. Multimedia is the mix or combination of media.

**Metadata** Data about data, or a "data dictionary" that provides information about data. Examples include information about data (for instance, types or compatibility issues), about files (versions, date of creation or updating, and author's name), or about content or applications (standards, specifications, software, or application versions). Metadata are different from tags, which are keywords that allow users to improve their searching capacity, because metadata usually contain a set of specifications and are structured according to a standardized concept using a well-defined metadata scheme. Metadata are particularly important for open educational resources.

**Micro-learning** An emerging learning theory according to which people learn more effectively if bite-sized information is delivered in small units that are easy to understand and apply. Because mobile devices present short chunks of information at a time due to small screen size, they are effective micro-learning tools.

**Mixed reality** A merging of real and virtual worlds to produce new environments and visualizations, where physical and digital objects coexist and interact in real time.

**Mobile device** Any digital device, such as a cell phone, e-reader, or gaming device, which is small and light enough to be portable and self-contained enough to allow the user to complete specific tasks.

**Mobile learning** Also known as "m-learning," this is learning through portable, handheld electronic devices, generally with wireless communication capabilities.

**Mode** The delivery approach by which learning takes place. In distance technologies, this can be print, radio, television, or Web-based technologies. In formal learning institutions, such as teacher training colleges, institutions of higher education, and universities, it may be *single-mode*, where courses and programs are mediated by either distance or contact-based methodologies. Or it may be *dual-mode*, or *mixed-mode*, where courses and programs may be mediated by a range of distance, resource-based, and contact-based methods (UNESCO Insititute for Lifelong Learning & Commonwealth of Learning, 2021, p. viii). A hybrid institution is a mixed-mode university or school but with delivery offered both online and in-person.

MP3/MP4  Audio compression standards developed by the Moving Picture Experts Group (MPEG) for encoding audio so that it can be transmitted via the Internet or another network. An MP3 player is a handheld device which allows a user to listen to MP3 files.

Multichannel learning  A vehicle whereby the interaction between learners and the learning source takes place through a variety of communication channels or modes (for example, print, television, email, Internet, and video).

Multimedia Messaging Service (MMS)  Similar to a text message, MMS is a standard method for sending and receiving messages that contain multimedia to and from a mobile phone over a cellular network.

Network  An arrangement of objects or people interconnected electronically. In telecommunications, networks are transmission channels interconnecting all client and server stations.

Non-fungible tokens (NFTs)  Cryptographic assets on a blockchain with unique identification codes and metadata that distinguish them from each other. Unlike cryptocurrencies, they cannot be traded or exchanged at equivalency (Sharma et al., 2022).

Norm-referenced assessment  An assessment in which a learner's or a group's performance is compared to that of a "norm" group. The test measures learner achievement against the norm—a mean level of performance—not against a criterion standard.

Notebook  A mini-laptop computer that is cheaper and more portable than a standard laptop.

Offset printing  This is a type of printing that uses "aluminum plates to transfer ink onto a rubber sheet. The image is then rolled onto the printing surface. This printing method is considered 'offset' because the ink is not transferred to the paper directly" (The InkTank, 2021).

One-way audio  Audio information broadcast only in one direction, not enabling the listener to respond to the audio or communicate with the broadcaster via the same means.

Online  The state of connectedness of a computer to a network. Online is the opposite of offline. In this guide, "online" is synonymous with "Web-based."

Open education resource (OER)  Open and free educational content (including metadata) for educational institutions and end users such as teachers, students, and lifelong learners. Since OER is liberally licensed for reuse in educational activities, it is free from restrictions on modifying, combining, and repurposing. Ideally, OER should be designed for easy reuse, in that open content standards and formats are being employed, and it should employ open-source software for which the source code is available, open application programming interfaces, and authorizations to reuse Web-based services.

Open enrollment  A term with multiple meanings depending on the jurisdiction. For instance, open enrollment may mean that learners may enroll in a distance program regardless of prior qualifications or standardized test scores, as with open universities. In the United States, open enrollment often refers to situations in which *students* may take classes (typically online or via virtual schools) in a school district that is not their own. Finally, open enrollment can refer to self-placed, online classes in which a learner begins and finishes at any point in the course trajectory as he or she deems necessary.

Open learning  This refers to policies and practices of openness in entry requirements (with minimal or no restriction on qualifications), choice of courses, place of study, and time of study (UNESCO, 2019, as cited in UNESCO Insititute for Lifelong Learning and Commonwealth of Learning, 2021, p. ix). It is both an educational philosophy and an instructional system whereby learning happens where, when, and how the learner requires it, and in which the learner controls many facets of the learning process.

Open-source software (OSS)  Software for which the underlying programming code is available to users so that they may read it, amend it, and build new versions of the software incorporating their changes. OSS comes in many types, differing mainly in the licensing term under which (altered) copies of the source code may be redistributed. Sometimes referred to as Free/Libre Open-Source Software (FLOSS), the significant difference is that OSS is usually, but not always, free, whereas FLOSS is always free.

Open university  A distance education institution in which learners from a particular nation and, increasingly, other nations enroll and study at a distance using print-based materials, phone, audio, video, television, and the Internet. Open universities typically admit all learners regardless of prior academic records or accomplishments and allow them to take courses as their schedule permits. The best-known and best-regarded open university is that of the United Kingdom. Within Asia, open universities are so large (having hundreds of thousands of learners) that they are often called "mega-universities."

Outcome evaluation  A type of summative evaluation that measures changes in designed outcomes, particularly as they affect the target group.

Performance-based assessment  A form of alternative assessment in which learners are asked to create, produce, or do something, often in settings that involve real-world application of knowledge and skills.

Peripheral  Any type of computer hardware that is added to a host computer in order to expand its abilities. Examples of peripherals include printers, scanners, and many assistive technology devices such as joysticks.

Place-shifting technology  A piece of "firmware" (computer software that controls a specific device or piece of hardware) to allow anyone with a broadband Internet connection to forward live or prerecorded video streams from their home television set, DVR, or other video source (such as a DVD player) for remote viewing on a computer, tablet, or mobile phone at any location with a high-speed Internet, cellular data, or Wi-Fi connection.

Podcast (from i*Pod* broad*cast*)  An audio broadcast that has been converted to an MP3 or other audio file format for playback in a digital music player or on a computer. Podcasts can be automatically downloaded to a computer via a subscription or RSS feed. Video-based podcasts video are sometimes referred to as *vodcasts,* though this term is fading away.

Polar pattern  A microphone's directionality or pickup pattern. It is the three-dimensional space surrounding the microphone capsule where it is most sensitive to sound. There are six main polar patterns: omnidirectional, cardioid, super cardioid, hyper cardioid, ultra-directional, and figure of 8 (Tobias, 2016).

Post  In an online environment, a written communication uploaded to a blog, discussion forum, bulletin board, wiki, or e-list. The term is used both as a noun and a verb.

Printcasting  A tool that allows users to create their own online magazines. It takes its name from the *Printcasting* website that offers that service; other examples of social publishing media sites include *Kobo* and *Lulu.*

Problem-based learning (PBL)  An instructional strategy in which learners solve a real-world problem. First developed for medical schools, PBL activities often are loosely structured, involve cooperative teaming, anchor all learning to a larger task or problem, and support the learner in developing ownership of the overall problem or task. Tasks are generally complex, involving higher-order thinking. Learners must often identify resources, overcome problems with data, and decide upon the content and format of the information gathered.

**Project-based learning/Project-oriented learning** An instructional philosophy in which learning is organized around a driving question or issue, learners collaborate to address this issue, find information, and then present their findings. Project-based learning, like problem-based learning, is complex, involves learner collaboration, and is characterized by an elevated level of learner autonomy. Unlike problem-based learning, with which it is erroneously conflated, a project-based approach may not involve a real-world problem (many project-based activities are *simulations* of real-world issues) and is not as loosely structured as problem-based learning.

**Quality assurance** A set of systematic management and assessment procedures used to monitor performance against objectives or standards and to ensure the achievement of quality outputs and quality improvements.

**Quality control** A procedure or set of procedures to ensure that products and services adhere to a set of predetermined standards or criteria for quality. It is part of a quality assurance system.

**Quasi-experimental design** An evaluation design that uses many, though not all, of the characteristics of an experimental design. For example, quasi-experimental designs use comparison groups rather than randomized groups.

**Quick response (QR) code** A two-dimensional image that consists of black modules arranged in a square pattern on a white background. QR codes store text, URLs, or other data. To use QR codes requires (1) a phone with a QR code generator (an app that is freely downloadable from Apple or Android app stores), and (2) a QR code reader. Some phones automatically include QR code generators and readers. Some applications, such as *Canva,* include QR code generators.

**Real Simple Syndication (RSS)** An Extensible Markup Language (XML) based format that allows for the syndication of Web content. Content can include data such as news feeds, events listings, news stories, headlines, project updates, or excerpts from discussion forums. Browsers allow users to set up automatic RSS subscriptions (feeds) so that content is delivered automatically from a website to the user's computer.

**Reliability** In evaluation, a measure accorded to an instrument that can be used repeatedly with distinct groups of similar subjects and yield consistent results. There are a number of ways to measure the reliability of an evaluation instrument.

- Test/retest method: The same instrument is used with the same group but at separate times, and results are then compared.
- Create two forms of the same instrument with slight variations in items, administer the instrument, and then compare results.
- Administer half of the instrument with one group and the other half with the same or a similar group, and then compare results.
- Joint-rater exercise: Where two individuals administer the same test to the same group and then examine the similarities and differences in item responses.

Most reliability uses statistical methods such as Cronbach's Alpha or the Kuder-Richardson Formula 20 (KR20).

**Rich media** A broad term for interactive media that mix audio, video, text, and animation. It is often used to classify high-graphics video or multimedia.

**Rubric** A scoring tool that contains criteria for scoring, descriptors of the criteria, and a scoring scale. Rubrics are matrix-like in their organization and can be *analytic* (with highly detailed descriptors pertaining to each criterion under each level of scoring), *holistic* (more general, with less descriptive information) or *single point* (with only the desired performance level, leaving blank the levels leading to this).

**SCORM (Sharable Content Object Reference Model)** A set of technical standards for eLearning software products. SCORM defines how to create "sharable content objects" (SCOs) that can be reused in different systems and contexts and governs how online learning content and LMSs communicate with each other.

**Screencasts/video screen capture** Digital recordings of an event that occurs on a computer screen. They typically contain audio narration and are oftentimes "how-to" videos—for example, how to use a software tool or how to perform a certain procedure. There are numerous screencast or screen capture tools such as *SnagIt*, *Camtasia*, *Movavi* or *Screencast-O-Matic*. Screencasts can be recorded, saved as MP4 files, and saved onto *YouTube* or storage platforms such as *Box* or *Drive*.

**Server** A computer that provides a service across a network. The service may be file access, login access, file transfer, printing, and so on. Many institutions are bypassing physical servers in favor of cloud computing and "software as a service," storing all content and files online and using only Internet-based applications.

**SIM (Subscriber Identity Module) card** A memory chip used in cellphones. Some SIM cards are portable and can be removed from a phone, while others cannot be removed.

**Simulation** A computer program (often Web-based) that models or imitates an entity, state of affairs, or process. Simulations provide users with experiences that might otherwise be unavailable due to cost, difficulty, or logistics. Some examples are flight simulation programs used to train airplane pilots, virtual dissection kits for learners to dissect a frog or cat in a biology class, or Web-based simulations to teach scientific or mathematical concepts. An example of the latter is *PhET Interactive Simulations* at the University of Colorado Boulder (USA).

**Single-mode distance institution** A distance learning institution in which teaching, learning, and administrative systems are designed and dedicated to the provision of distance education. Examples include many open universities. Single-mode universities are now more commonly known as online universities.

**Smart phone** A mobile phone that has many of the same functions as a handheld computer, including email, photo and video capture, document viewing and development, and Internet browsing. Its functioning is supported by apps.

**SMS (short messaging service)** A text message composed on and sent via cell phone.

**Social constructivism** An aspect of constructivist learning theory, advocated to large degree by the Russian psychologist Lev Vygotsky, who stressed the criticality of the learner's social interaction with more knowledgeable peers or colleagues. Social constructivism essentially states that learning is developed through personal relationships and with participants in a shared learning experience.

**Social media** User-created media (video, audio, text, or multimedia) that are published and shared in a social environment, for example, a blog, wiki, or video hosting site such as *Facebook*, *Instagram*, *YouTube*, or *Flickr*.

**Social networking sites** Internet sites that enable the creation of online communities of people who share interests and activities, or who are interested in exploring the interests and activities of others. Most social network services are Web-based and provide a variety of ways for users to interact, such as posting and instant messaging services. The best-known examples of social networking sites are *Facebook* and *Linked In*, both of which contain professional interest groups such as those for teachers.

Software  A set of instructions for the computer. A series of instructions that perform a particular task is called a program. Two major categories of software are system operating software and application software.

Student-centered learning  An instructional approach that advocates that learners bring unique prior knowledge, experience, and beliefs to a learning situation; construct knowledge in multiple ways using a variety of authentic tools, resources, experiences, and contexts; learn by interacting socially and collaborating in order to solve real-world problems; and create their own understanding of situations. It views learning as an active and reflective process. See also *active learning* and *learner-centered instruction.*

Summative assessment  A final assessment, such as an exam administered to learners for the purpose of judging performance, grading, or certifying a learner's level of knowledge.

Summative evaluation  An evaluation occurring at the end of a program or project designed to determine the program's overall effectiveness or worth.

Synchronous learning  Individuals learn at the same time but in separate places. This might involve instructors and learners interacting at the same time via distance using a phone, video conferencing tools, or via chat.

Tablet  A wireless portable computer the size and thickness of a notepad or book. It functions as the user's primary personal computer, as well as a note-taking device in some cases. The most well-known tablet is the iPad.

Tagging  A process by which users can provide metadata (data about content) about particular Web-based content in order to facilitate searching and sharing. It is particularly common in social bookmarking sites such as *Pinterest* and photo-sharing sites such as *Flickr,* which are also called *collaborative tagging* sites. Though tagging can create metadata, metadata are not necessarily tagging.

Teleport  A regional telecommunications network that provides access to communications satellites and other long-distance media. "Teleporting" is also used as a verb to describe users moving from one virtual world or immersive environment to another.

Tethering  Connecting a cell phone or other mobile device and a computer via a cable or wireless connection. The purpose of tethering is for the mobile device to gain Internet access via the connection to the computer.

Total cost of ownership  The financial estimate of all costs associated with a particular program, purchase, or intervention. Using technology as an example, it includes all capital and recurrent costs for equipment, connectivity, supplies, supporting infrastructure, training, and support for a fixed period (e.g., five years or a decade).

Thin client  A thin-client system is a low-cost computing and "virtual desktop computing model. It runs on the resources stored on a central server instead of a computer's resources" (Gillis, 2021).

Two-way audio  A voice-only communication system that allows for two-way communication—listening and speaking. Audio can be transmitted via phone, satellite, the Internet, or high- frequency radio. The best-known example of two-way audio instruction for distance learning is Australia's Schools of the Air.

Ubiquitous learning  Learning via mobile technologies so that a course of study can be accessed any time, any place. It often is synonymous with 1:1 computing.

Universal design for learning (UDL)  A design principle—for buildings, technology, the environment, industrial products, and so on—

that aims to be barrier free. UDL advocates equitable use, flexibility in use, simple and intuitive use, perceptible information, tolerance for error, low physical effort, and size and space for approach and use (CAST, Inc., 2022).

Universal Instructional Design (UID) This is the design of instructional materials and activities that make learning goals achievable by "individuals with wide differences in abilities to see, hear, speak, move, read, write, understand English, attend, organize, engage, and remember" (Burgstahler, 2007, p. 1, as cited in Elias, 2010).

USB flash drive A Universal Serial Bus, or USB, is a small, portable flash memory card, also known as a thumb drive or pin drive, which plugs into a computer's USB port and functions as a portable hard drive. USB flash drives are small and easy to use and can plug into any computer with a compatible drive.

Validity In evaluation, validity refers to the accuracy of an assessment—whether or not it measures what it is supposed to measure. There are generally considered to be at least three types of validity. One is *content* validity—the extent to which the content of the test matches the instructional objectives. The second is *construct* validity—the extent to which a test, instrument, or assessment corresponds to other variables, as predicted by some rationale or theory. A third is *criterion* validity—the extent to which scores on the test agree with some externally established criterion or criteria.

Evaluations are concerned typically with two types of validity: *internal* (Did the innovation make a difference to the population under study?) and *external* (Can the effects of the evaluation be generalized to other populations, situations, or locations?).

Videocassette recorder (VCR) A magnetic videotape recorder for recording and playing back television programs or prerecorded video.

Videoconferencing Two-way, real-time transmission between people in different locations of audio and video via a local area network or the Internet. Videoconferencing can be as simple as using *Zoom* or may involve hardware and software solutions furnished by companies such as Poly.

Virtual learning See *Online learning* or *eLearning*.

Virtual reality Computer-simulated environments that can mimic the real world as well as imaginary ones. VR consists of virtual reality hardware (headsets and motion controllers) and virtual reality software—a platform that uses computer vision and 3D modeling to "generate, move and clone images in a digital environment" (Mattoo, 2022).

Virtual schools An institution, sometimes called a "cyber school," that teaches courses entirely or primarily through online methods. Though there are tens of thousands of commercial and non-accredited courses available online, the term "virtual school" is generally reserved for accredited schools that teach a full-time (or nearly full-time) course of instruction designed to lead to a degree. At the primary and secondary level, accreditation means that virtual schools tend to receive public funding. Some publicly funded and private universities also provide accredited online degrees.

Virtual world These are online simulated and persistent environments. Thousands of users can interact simultaneously within simulated three-dimensional spaces via avatars (graphical representations of the user) (Messinger et al., 2009, p. 204). Avatars are usually depicted as textual two- or three-dimensional graphical representations, although other forms are possible—auditory and touch sensations, for example. Virtual worlds are often an important feature of online gaming. They can be self-determined, theme-based, community-based, and they can be organized for adults or children (Messinger et al., 2009).

**Voice over Internet Protocol (VoIP)** A transmission technology for delivery of voice communication over the Internet, also known as Internet telephony. By employing software such as *Skype* or *FaceTime*, users can access the digital audio features of the Internet to talk with another person using a computer. Typically, computer-to-computer calls are free, and computer-to-phone calls involve a nominal charge.

**Web 2.0** The second generation of the World Wide Web. While Web 1.0 was largely a "read" medium, Web 2.0 is a "read/write" medium in which users create and publish content without complicated authoring tools such as Web design software. Examples of Web 2.0 content include blogs, wikis, and social networking sites. The term "Web 2.0" is often used synonymously with "social media," though social media is a category of Web 2.0 applications.

**Webcast** The equivalent of traditional television and radio broadcasting, transmitted live over the Internet, or a recorded webinar that is archived and able to be viewed asynchronously. Webcasts can be used as stand-alone events for which participants register or as a component of an online course, conference, or session (Commonwealth of Learning, 2008).

**Webinar** An interactive, Web-based seminar in which instructors and learners interact using documents such as *PowerPoint* presentations, video, audio, and chat tools.

**Wireless** The ability of one Information and Communication Technology (ICT) device—for example, a computer or cell phone—to communicate with another without cables or wires.

**World Wide Web** An information distribution method that operates via the Internet to enable users to access information resources linked to uniform resource locators (URLs) or other codes. Webpages are displayed in browsing software and may contain links (often called "hypertext") to other resources.

**xAPI** Experience Application Programming Interface, or xAPI, is an eLearning specification that makes possible data collection about the wide range of experiences a person has within online and offline learning activities. xAPI uses a shared format for both receiving and sending data (xAPI.com, 2023).

**XML** (extensible markup language) A flexible text format for creating structured computer documents on the World Wide Web.

## References

Boethel, M., & Dimock, K. (1999). *Constructing knowledge with technology: An overview of the literature.* Southwest Educational Development Laboratory.

Burns, M. (2021). eLearning has improved in the last 7 years...What are the drivers of these changes? *eLearning Industry*. https://elearningindustry.com/online-learning-has-improved-in-last-7-years

CAST, Inc. (2022). *The UDL guidelines*. https://udlguidelines.cast.org/

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences.* Academic Press.

Commonwealth of Learning. (2008). *Education for a digital world: Advice, guidelines and effective practice from around the globe.* http://oasis.col.org/handle/11599/52

Creative Commons. (n.d.). *About CC licenses*. https://creativecommons.org/about/cclicenses/

Dimock, K. V., Burns, M., Heath, M., & Burniske, J. (2001, December). *Applying technology to restructuring learning: How teachers use computers in technology assisted constructivist learning environments.* Southwest Educational Development Laboratory.

Elias, T. (2010). Universal instructional design principles for Moodle. *The International Review of Research in Open and Distributed Learning, 11*(2), 110-124. https://doi.org/10.19173/irrodl.v11i2.869

Engati. (2023, February 5). *6 types of chatbots: Which is best for your business?* Engati. https://www.engati.com/blog/types-of-chatbots-and-their-applications

Fischer, T. (2021). What Is liquid crystal display (LCD)? *Lifewire*. https://www.lifewire.com/what-is-liquid-crystal-display-lcd-2625913

Gartner. (2023). Bandwith. *Information technology gartner glossary.* https://www.gartner.com/en/information-technology/glossary/bandwidth

Ghayas, A. (2019). GSM frequency bands: What frequencies do GSM networks use? *Commsbrief.* https://commsbrief.com/gsm-frequency-bands-what-frequencies-do-gsm-networks-use

Gillis, A. S. (2021, September). *Thin Client (Lean Client).* TechTarget. https://www.techtarget.com/searchnetworking/definition/thin-client

Goff, J. S. (2017). Personalized learning: The state of the field & future directions. *Center for Curriculum Redesign*. https://dam-prod.media.mit.edu/x/2017/04/26/PersonalizedLearning_CCR_April2017.pdf

GPS.gov. (2022). *Space segment.* https://www.gps.gov/systems/gps/space/

Hanna, K., & Scarpati, J. (n.d.). IPTV (Internet protocol television). *TechTarget.* https://www.techtarget.com/searchnetworking/definition/IPTV-Internet-Protocol-television

Hayes, A., Brown, J., & Kvilhaug, S. (2022). Blockchain facts: What it is, how it works and how it can be used. *Investopedia*. https://www.investopedia.com/terms/b/blockchain.asp

Hill, C. J., Bloom, H. S., Black, A. R., & Lipsey, M. W. (2008). Empirical benchmarks for interpreting effect sizes in research. *Child Development Perspectives, 2*(3), 172–177. https://doi.org/10.1111/j.1750-8606.2008.00061.x

Illuminated Integration. (2020, November 13). *7 Types of Acoustic Treatments*. https://illuminated-integration.com/blog/7-types-of-acoustic-treatments/

Keegan, D. (1996). *Foundations of Distance Education.* Routledge.

Khatri, V. (2023). What is coding? What is coding used for? *Hackr.io*. https://hackr.io/blog/what-is-coding-used-for

Klopfer, E., Osterweil, S., & Salen, K. (2009). Moving learning games forward: Obstacles, opportunities and openness. *Massachusetts Institute of Technology Education Arcade*. https://education.mit.edu/wp-content/uploads/2018/10/MovingLearningGamesForward_EdArcade.pdf

Martin, F., Polly, D., & Ritzhaupt, A. (2020). Bichronous online learning: Blending asynchronous and synchronous online learning. *EDUCAUSE*. https://er.educause.edu/articles/2020/9/bichronous-online-learning-blending-asynchronous-and-synchronous-online-learning

MasterClass. (2021). *Understanding font families: 5 types of font families*. https://www.masterclass.com/articles/font-family-guide

Mattoo, S. (2022). What Is virtual reality? Types, benefits, and real-world examples. *G2*. https://www.g2.com/articles/virtual-reality

Means, B., Toyama, Y., Murphy, R., Bakia, M., & Jones, K. (2009). *Evaluation of evidence-based practices in online learning: A meta-analysis and review of online learning studies.* United States Department of Education.

Messinger, P., Stroulia, E., Lyons, K., Bone, M., Niu, R., Smirnov, K., & Perelgut, S. (2009). Virtual worlds—past, present, and future: New directions in social computing. *Decision Support Systems, 47*(3), 204–228. https://doi.org/10.1016/j.dss.2009.02.014

Miao, F., Holmes, W., Huang, R., & Zhang, H. (2021). *AI and education: Guidance for policymakers.* United Nations Educational, Scientific and Cultural Organization.

Pelletier, K., Brown, M., Brooks, D. C., McCormack, M., Reeves, J., & Arbino, N. (with Bozkurt, A., Crawford, S., Czerniewicz, L., Gibson, R., Linder, K., Mason, J., & Mondelli, V.) (2021). *2021 EDUCAUSE Horizon Report: Teaching and Learning Edition.* EDUCAUSE. https://library.educause.edu/-/media/files/library/2021/4/2021hrteachinglearning.pdf

Penn State University. (2021). What is hybrid learning? *Hybrid Learning @ Penn State*. https://sites.psu.edu/hybridlearning/what-is-hybrid/

Sharma, R., Clemon, D., & Rathburn, P. (2022). Non-fungible token (NFT): What it means and how it works. *Investopedia*. https://www.investopedia.com/non-fungible-tokens-nft-5115211

Slavin, R. (1990). IBM's writing to read: is it right for reading? *Phi Delta Kappan*, Vol. 72, No. 3, pp. 214–216. http://www.jstor.org/stable/20404361

Techopedia. (2017). Massively multiplayer online role-playing game (MMORPG). *Techopedia*. https://www.techopedia.com/definition/1919/massively-multiplayer-online-role-playing-game-mmorpg

Telephone World. (2021).*The first digital cellular systems – TDMA, GSM and iDEN (2G)*. https://telephoneworld.org/cellular-phone-history/the-first-digital-cellular-systems-tdma-gsm-and-iden-2g/

The InkTank. (2021). Offset printing vs. digital printing. https://www.kaocollins.com/inktank/offset-vs-digital-printing/

Tobias, T.K. (2016). Microphone polar patterns. LEWITT. https://www.lewitt-audio.com/blog/polar-patterns

UNESCO Institute for Statistics. (2023). *Information and communication technologies (ICT): Definition*. https://uis.unesco.org/en/glossary-term/information-and-communication-technologies-ict

UNESCO Insititute for Lifelong Learning & Commonwealth of Learning. (2021). *Guidelines on open and distance learning for youth and adult literacy.* https://unesdoc.unesco.org/ark:/48223/pf0000379397

United Nations Educational, Scientific and Cultural Organization International Centre for Technical and Vocational Education and Training. (2017). *Distance learning*. https://unevoc.unesco.org/home/TVETipedia+Glossary/filt=all/id=154

Wiggins, G., & McTighe, J. (2005). *Understanding by design* (2nd ed.). Association for Supervision and Curriculum Development.

xAPI.com. (2023). xAPI solved and explained. https://xapi.com/

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