DISTANCE EDUCATION FOR TEACHER TRAINING:

Modes, Models, and Methods

Mary Burns

Education Development Center, Inc.

Washington, DC

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About the Author

Mary Burns is a senior technology and teacher professional development specialist at EDC. A former 10-year teacher in the United States, México, and Jamaica, she has worked in the area of technology-enabled professional development since 1997, instructing, designing, and evaluating both distance-based and face-to-face professional development for teachers, teacher educators, and instructional coaches. She has authored peer-reviewed papers, books, articles, and blog posts about teacher professional development, distance learning, and teaching with technology. She works in Asia, Africa, the Middle East, Latin America, the Caribbean, Europe, and the United States.

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DEVELOPING CONTENT

Table of Contents

EDC

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*

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[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).

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[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

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[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,

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[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 Príncipé, 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

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[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

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[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

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[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

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[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

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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.

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]

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.)

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*,

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[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.

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[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).

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[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). • Source code and materials can be modified, so it is readily available and usable. • Teachers can adapt content to fit their classroom needs, thereby learning content creation and instructional design skills (Paskevicius, 2021). • 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. • 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. • It can allow for more culturally responsive and local-language content • It can tap more contributors. • It avoids pitfalls of trying to please large education districts with one standard product. • 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. • 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. • It can be freely shared among institutions, regions, and nations, avoiding the need to "re-invent the wheel." • 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. • Open content taken from elsewhere may mean that content does not conform to local standards. • Despite efforts to create local-language content, most content is in English and other dominant or "colonial" languages (French, Portuguese, English, Spanish). • There is abundant open content for some forms of distance education (such as online learning), and little to none for others (such as television). • 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. • Many countries may lack capacity to develop high-quality open education resources or maintain and update such resources. • 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. • It is difficult to generate peer-produced materials: There is a commitment to a certain way of working, writing, and collaborative authorship. • There is no shared, national model for university open textbook use. • The gap between university faculty's willingness to use OER and their ability to use OER may be wide. • Because OER is free, one sometimes "gets what you pay for"—quality and accuracy may be poor. • OER may lack metadata, so the provenance of content (by whom, for whom, why, and how it was developed) may be lacking. • 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.

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[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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