



DISTANCE EDUCATION FOR TEACHER TRAINING:

Modes, Models, and Methods

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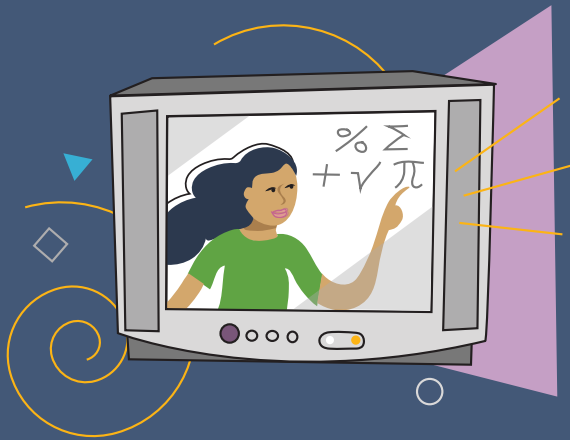
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Section I. Chapter 3

VISUALLY-BASED DISTANCE EDUCATION

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

3.1 Overview

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

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

Television and video possess numerous strengths as modes of teacher education. Like radio, television is a mass communication medium with extensive reach. Both TV and video also are available via the Internet or cellular networks on phones, tablets, and laptops. Television, especially, is a technology with which most teachers are familiar, thus requiring little training, and programs can be recorded and rebroadcast to teachers at their convenience. If informative and engaging, television and video can furnish examples of classroom-based teacher-student interactions, thus enabling teachers to observe the management of learning activities. As this chapter will discuss, visually-based—or, more accurately, audio visually based distance education—is a powerful form of teacher learning, whether transmitted on a disc, via a phone or the Internet, or broadcast over the airwaves. It can help teachers master the content they

are supposed to teach but may not know, guide implementation, spark ideas, increase teacher understanding of difficult-to-explain procedures or processes, and model techniques and strategies that are difficult to present in either print or via radio. Like audio, which was discussed in the previous chapter, visually-based learning can do so in just-in-time ways that increase engagement and reduce cognitive load.¹

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

3.2 Television

Television has tremendous reach and enjoys the advantage of being a familiar and engaging visual medium. Approximately 74% of the world's households have access to television. Though free-to-air digital terrestrial TV (FTA DTT) is still the most common access point, all forms of television viewership continue to grow² (Statista, 2022).

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

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

Figure 3.1 Television During COVID-19 Pandemic School Lockdowns

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

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

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

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

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

Once a decades-long staple of distance education, TV for teacher education has waned as it has been replaced by video-based or

online learning. That said, countries with high rates of TV ownership, educational television production capabilities, and regions with poor Internet infrastructure may find earlier iterations of television-based distance education and current untapped television programming to be potentially relevant options for teacher education.

3.3 TV as School

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

examination of television geared explicitly toward teacher learning.

3.3.1 Instructional Television

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

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

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

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

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

- increase student test scores in math, science, and language compared to students who attend non-*Telesecundaria* government schools⁶ (Beg et al., 2019; Borgheson & Vasey, 2021, p. 4);
- significantly increase school attendance and expand educational access to students who have dropped out of school (Cruz et al., 2016, p. 10; Plata, 2022); and

³ México’s *telesecundaria* model has since been adopted in Guatemala, Honduras, Panamá, El Salvador, Costa Rica, Venezuela, Colombia, and Perú.

⁴ This is broadcast in the state of Amazonas, an area larger than France.

⁵ This is broadcast via the educational channel of the South Africa Broadcasting Corporation (SABC) and over *YouTube*.

⁶ Data from Pakistan and Brazil echo this particular finding.

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

3.3.2 Educational Television

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

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

Globally, popular educational television for children has increasingly taken hold in the Global South, with programs such as Pakistan's *Taleem Ghar*,⁸ the aforementioned Lao PDR's *My House*, and Tanzania's *Ubongo Kids* and *Akili and Me* joining long-running international variations of *Sesame Street* (Burns, 2021). The impact of

these programs on children's learning has been extensively documented. For example, a synthesis of 24 studies of over 10,000 children in 15 countries,⁹ along with randomized controlled trials (RCTs) and quasi-randomized control studies in Tanzania, point to significant positive effects of exposure to children's educational programming such as *Sesame Street*, *Ubongo Kids*, and *Akili and Me* on children's:

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

3.3.3 Benefits for Students. Benefits for Teachers?

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

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

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

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

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

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

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

Nonetheless, there is reason to believe greater focus on teacher learning in instructional and educational television initiatives could help address teacher quality issues. First, the examples

of interactive audio instruction, Computer Aided Instruction, and virtual classes¹⁰ affirm that efforts that use technology to complement and support teachers tend to have better outcomes than those that use technology to *replace* teachers and that such initiatives can improve teacher learning as they support student learning (Beg et al., 2019; Snilstveit et al., 2015).

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

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

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

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

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

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

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

3.4 Television-based Teacher Education

For decades, television was a popular mode of teacher training in countries with well-developed broadcasting or satellite infrastructure (e.g., Cuba and the United Kingdom), that cover a large geographical expanse (Canada, Australia, China, México, Brazil, and the United States), and whose large or dense populations make television a cost-effective distance education model for teacher training (India and the United Kingdom). Globally, Canada, China, Indonesia, México, and Brazil all spearheaded the use of television for teacher pre-service and in-service instruction. As a result, teachers in those countries have long

participated in television-based professional development in their homes or classrooms, or, in areas where television is not widely available, in viewing centers. While shifts to online learning, the rise of Internet-based TV, and high production costs associated with television have rendered it somewhat anachronistic as a distance education tool for teachers in many parts of the globe, in others it may still play a vital role in teacher education, as shown in the following examples.

3.4.1 Instructional Television for Teachers: Portugal

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

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

But *telescola*’s second larger aim was to create a pipeline for qualified secondary teachers. Each year, approximately 2,500 in-class teachers (“*monitores*”) received professional development in content, instruction, and classroom management as well as mentoring from “*ex cathedra*” teachers (TV teachers) in Lisbon as their main path to certification. As *monitores* received more annual professional development annually, they were incrementally granted more in-class responsibilities. This occurred over a number of years under the guidance and supervision of *ex cathedra* teachers until these *monitores* became certified teachers and the

teacher of record in the classroom, thus reducing the need for TV teachers. As Portugal expanded its secondary education system and built a cadre of qualified secondary teachers, the number of *telescolas* decreased and the program eventually ended in 2003 (Barros, 2012).

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

3.4.2 Teacher-Pre-Service Preparation: China

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

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

Teacher training via television universities was supplemented until approximately 2010 by 100 instructional television channels operating at both

the national and regional levels. Until the last decade, China’s TV universities, such as Shanghai Television University and China Central Radio and Television University, were the largest distance education universities in the world. (They have since been transformed into the Shanghai Open University and China Open University, respectively.)

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

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

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

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

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

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

3.4.4 Upgrading Teacher Skills via Instructional TV: Brazil

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

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

The Public Broadcasting Service (PBS) has long been at the forefront of instructional,¹³ as well as educational, television in the U.S. 1987 marked the debut of *French in Action*—a 52-episode French-language immersion program co-produced by Yale University and the PBS station WGBH. The program used a planned immersion approach

to language learning—viewers were exposed to authentic French language and culture through a continuing storyline—an American university student abroad in Paris who is befriended by young French woman. The story was embedded with targeted grammar points, vocabulary, and culture, often in a humorous way (Annenberg Learner, 2022).

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

3.4.6 Dual Audience Direct Instruction with TV: Namibia

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

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

¹² See <https://tvbrasil.ebc.com.br/saltoparaofuturo>

¹³ See for example, *Parlons Français*, at <https://tinyurl.com/3pbtecyu>

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

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

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

ITV is not new to distance education. In the 1990s, ITV, or two-way television, was used extensively in rural areas of Australia and the U.S., transmitted from schoolroom to schoolroom, to help pre-service teachers observe teaching behaviors and routines of more experienced teachers. ITV has also traditionally been part of “live telecasts,” i.e., university classes transmitted to learners offsite (Gibson & Gibson, 1995). In 2009, Indonesia's *TV Edukasi* began broadcasting 48 hours of weekly programming to pre- and in-service teachers across Indonesia to help them obtain an advanced

degree and acquire advanced competencies. The Universitas Terbuka (UT) provided the content and awarded credits to the teachers. Programs were interactive—teachers could phone in and have live on-air, phone-based discussions with the instructor and other viewers.

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

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

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

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

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

3.5 Serialized Television

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

3.5.1 Popular TV as Teacher?

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

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

Figure 3.2 Learning from Interactive TV for Children

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

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

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

In Ireland, proficiency in the Irish language is a prerequisite for university graduation and entry into certain civil service jobs. Yet the linguistic proficiency of teachers of the Irish language is low. To revitalize societal interest in the Irish

language and attract more and better-qualified candidates to teach Irish, the Irish government turned to television in the mid-1990s. *TG Ceathair*, a free-to-air public service television network that also is available online and via an on-demand service TG4 Player in Ireland, has helped to make the language more attractive and accessible to viewers (Ó Ceallaigh & Ní Dhonnabháin, 2015). However, there is no evidence that the channel's popularity has translated into higher caliber Irish-language teachers or instruction in schools.

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

3.5.2 Changing Behaviors and Mindsets: The Sabido Method

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

reinforce behavioral and social change” (Singhal et al., 2004, p. 5).

The Sabido Method has four specific design elements:

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

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

use in all countries—30 of the studies were statistically significant (Westoff et al., 2011).¹⁵

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

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

The popular American “mockumentary,” *Abbott Elementary* (produced by an ex-teacher), has introduced its viewers to complex challenges that teachers confront daily and has been lauded by teachers for its realistic and humane portrait of

the profession (Jacobs, 2022). More specifically, it appears to have taken a page from the Sabido Method, wittingly or unwittingly, as its episodes appear to promote positive mindsets and practices that are critical to good teaching—the importance of collaboration, a “students-first” mentality, creative problem solving, the importance of mentors for young teachers, and the joy of teaching (Bendici, 2022).

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

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

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

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

3.6 Video

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

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

3.6.1 Video for Teacher Professional Development

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

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

Video case studies present teachers with a problem or situation via video (for example, how to differentiate learning in a large classroom) using supporting documentation such as lesson plans and student work and embedding it in analytic discussions. One example of this is *Success at the Core*,¹⁷ a video series designed to help American teachers implement the Common Core curriculum. Each video case includes teachers discussing their design and instructional processes and materials, shares video segments of teaching, and provides discussion and reflection questions

(Since *Success at the Core* requires a fee, another potential case study option might be *TeacherTV*,¹⁸ which is free, though no longer updated). These case studies allow teachers to study a classroom or an instructional strategy, such as co-teaching, in depth, modelling how a process should actually be implemented.

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

Analyzing one's own practice: Southeast Asia

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

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

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

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

¹⁹ See <http://timssvideo.com/>

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

Modelling standards-based teaching: Australia

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

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

3.7 Considerations: Television and Video for Distance Education

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

3.7.1 Benefits of Visually-based Distance Education

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

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

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

Video can reduce cognitive load

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

²⁰ See here: <https://www.aitsl.edu.au/standards>

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

Video can support dual channel learning

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

Video is a popular tool for self-learning

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

Such a claim is supported by a substantive body of research. Over 100 randomized trials using video in higher education suggested that, on average, videos led to better learning outcomes compared with other methods and adding videos to existing content showed strong effect sizes. In the 83 studies that swapped existing learning for videos, there were small learning benefits, with meaningful positive effects in approximately

half of cases where video was used (Noetel et al., 2021). In addition to its strong effect sizes, video's ability to help learners acquire skills results from its "more authentic perspectives ... (it allows) learners to see authentic demonstrations of skills with real people ... through the eyes of the performer" (Noetel et al., 2021, p. 19).

The ability to control viewing confers multiple benefits on learners

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

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

As they have with audio and print, the World Wide Web and mobile devices have appropriated video, making it more flexible, accessible, and ubiquitous, particularly when used with social media applications such as *TikTok*, *YouTube*, *Instagram*, and *WhatsApp*. The video capabilities of many phones have increased—particularly in the case of high-end phones—allowing for easier creation of professional-looking high-resolution video at low cost. During COVID-19 pandemic school closures across the world, governments

in Latin America, teachers in refugee camps in Bangladesh, the Education and Training Board in Ireland, and teachers across the globe shared video resources on remote teaching and using technology via *WhatsApp*, *Facebook*, and *TikTok* (Burns, in press; Cobo et al., 2020).

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

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

3.7.2 Limitations of Visually-based Distance Education

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

Video is a technology, not an instructional methodology or curriculum

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

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

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

Television has formidable entry barriers

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

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

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

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

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

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

3.8 Summary of Visually-based Distance Education

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

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

Roles in Teacher Professional Development	Strengths	Limitations
<ul style="list-style-type: none"> • Television delivers content and concepts to learners across the curriculum. • Video and television are used to develop teachers' skills and knowledge. • Video and television can provide views of real classroom practices and learning activities. • Video and television provide teachers with learning resources that show distant places and graphical representations of concepts or historical events. • Visual medium could (but typically does not) guide teacher through scripted, hands-on classroom activities. • Video and television visually demonstrate difficult-to-understand concepts such as instructional or assessment strategies, communication strategies, and content-based procedures. • Video and television demonstrate new modes of teaching and learning through views of real classroom activities. 	<ul style="list-style-type: none"> • Video and television are both powerful and familiar. • They can be used to "bring" viewers to the site of events and phenomena. • Observing demonstrations of classroom management and other teaching practices helps teachers implement new techniques effectively. • Television, in particular, can reach large populations of students and teachers. • Television and video can support instructional continuity across grades and subjects. • Recording classes shows teachers their own interactions, habits, and progress toward effective teaching. • Devices are equipped with video-editing software, so video can be produced inexpensively and without a great deal of production expertise. • On-demand TV facilitates TPD at times convenient for teachers. • The Internet, gaming consoles (such as the Wii), Virtual Reality head-mounted displays (HMDs), and apps for smart phones and tablets can extend TV and video's reach and functionality. 	<ul style="list-style-type: none"> • Over time, the technical quality of video and television fades and content may look, sound, feel, and be outdated. • The highly didactic nature of instructional television—the TV teacher essentially standing and delivering instruction—represents a strong disconnect between how information is delivered versus how students and teachers typically consume information. • Television broadcasts may be subject to external political and economic disruptions. • Television has formidable barriers: production costs and skills, access to electricity and robust bandwidth. • Individually or locally produced video may be of such inferior quality that it turns off potential learners. • Increasing evidence shows that declining attention spans mean that teachers "tune out" video that is more than a few minutes in length.

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References

- Akbari, R. (2007, June). Reflections on reflection: A critical appraisal of reflective practices in L2 teacher education. *System*, 35(2), 192–207. doi:<https://doi.org/10.1016/j.system.2006.12.008>
- Annenberg Learner. (2022). *French in action*. Annenberg Learner/ <https://www.learner.org/series/french-in-action/>
- Bandura, A. (1977). *Social learning theory*. Prentice Hall.
- Barros, R. (2012). *Telescola: perspectiva de monitores. Dissertação (Mestrado em Ensino de Matemática)*. Faculdade de Ciências e Tecnologia, na Universidade Nova de Lisboa. <http://hdl.handle.net/10362/9125>
- Bau, N., & Das, J. (2020). Teacher value added in a low-income country. *American Economic Journal: Economic Policy*, 12(1), 62–96. doi:10.1257/pol.20170243
- Beg, S., Lucas, A., Halim, W., & Saif, U. (2019). *Engaging teachers with technology increased achievement, Bypassing teachers did not*. NBER Working Paper 25704. <http://www.nber.org/papers/w25704>
- Bendici, R. (2022, September 6). *Abbott elementary: 5 lessons for teachers*. Tech & Learning. <https://www.techlearning.com/news/abbott-elementary-5-lessons-for-teachers>
- Bold, T., Filmer, D., Martin, G., Molina, E., Rockmore, C., Stacy, B., . . . Wane, W. (2017). *What do teachers know and do? Does it matter? Evidence from primary schools in Africa. Background paper to the 2018 world development report*. World Bank. <https://documents1.worldbank.org/curated/en/882091485440895147/pdf/WPS7956.pdf>
- Borgheson, E., & Vasey, G. (2021). *The marginal returns to distance education: Evidence from México's telesecundarias*. https://gabriellevasey.github.io/MarginalReturns_BorghesanVasey.pdf
- Borko, H., Jacobs, J., Eiteljorg, E., & Pittman, M. (2008). Video as a tool for fostering productive discussions in mathematics professional development. *Teaching and Teacher Education*, 24(2), 417–436. doi:<https://doi.org/10.1016/j.tate.2006.11.012>
- Borzekowski, D. (2018). A quasi-experiment examining the impact of educational cartoons on Tanzanian children. *Journal of Applied Developmental Psychology*, 54, 53–59. <https://www.sciencedirect.com/science/article/abs/pii/S0193397317300850>
- Burns, M. (2017, March 2). *From Big Bird to cattle barons: Television as teacher*. Global Partnership for Education. Education for All Blog. <https://www.globalpartnership.org/blog/big-bird-cattle-barons-television-teacher>
- Burns, M. (2019, March 26). *Using video for teacher professional development*. Global Partnership for Education: Education for All Blog. <https://www.globalpartnership.org/blog/using-video-teacher-professional-development>
- Burns, M. (2021). *Background paper prepared for the 2023 global education monitoring report, technology and education: Technology in education*. United Nations Educational, Scientific and Cultural Organization. <https://learningportal.iiep.unesco.org/en/library/background-paper-prepared-for-the-2023-global-education-monitoring-report-technology-and>
- Burns, M. (in press). *Barriers and supports for technology integration: Views from teachers. Background chapter prepared for the global education monitoring report: Technology and education*. United Nations Educational, Scientific and Cultural Organization.
- Center for Education Policy Research. (2022). *Best foot forward: Video observation toolkit*. Center for Education Policy Research Harvard University: <https://cepr.harvard.edu/video-observation-toolkit>
- Central China Normal University. (2020, April 19). *CCNU's online teaching guidance and training work reported by China Educational Television*.
- Cobo, C., Hawkins, R., & Rovner, H. (2020, March 31). *How countries across Latin America use technology during COVID-19-driven school closures*. World Bank Blogs. <https://blogs.worldbank.org/education/how-countries-across-latin-america-use-technology-during-covid19-driven-school-closures>
- Collins, R., Elliott, M., Berry, S., Kanouse, D., & Hunter, S. (2003). Entertainment television as a healthy sex educator: The impact of condom-efficacy information in an episode of Friends. *Pediatrics*, 112(5), 1115–1121. <https://doi.org/10.1542/peds.112.5.1115>
- Cruz, P., Goulart, F., Kwauk, C., & Perlman Robinson, J. (2016). *Media center innovating with distance learning in Amazonas, Brazil*. Center for Universal Education: Brookings Institute. <https://www.brookings.edu/wp-content/uploads/2016/07/FINAL-Media-Center-Case-Study.pdf>
- Dreesen, T., Akseer, S., Brossard, M., Dewan, G., Giraldo, J., Kamei, A., . . . Ortiz, J. S. (2020). *Promising practices for equitable remote learning: Emerging lessons from COVID-19 education responses in 127 countries. Innocenti Research Brief*. United Nations International Children's Emergency Fund. <https://reliefweb.int/sites/reliefweb.int/files/resources/IRB%202020-10.pdf>
- Effat University. (2022). *Admissions for male and female students are open in all bachelors and masters program*. Effat University Aspire to Achieve: <https://www.effatuniversity.edu.sa/>
- e-sgoil. (n.d.). e-sgoil. <https://www.e-sgoil.com/>

- Eutelsat. (n.d.). *A guide to TV distribution models*. Eutelsat: <https://www.eutelsat.com/en/blog/what-are-tv-distribution-models.html>
- Fabregas, R. (2019). *Broadcasting education: The long-term effects of México's telesecundarias* [Working paper]. Harvard University. <https://scholar.harvard.edu/rfabregas/publications/broadcasting-human-capital-long-term-effects-mexicos-telesecundarias>
- Franceinfo. (2020, April 20). *Continuité pédagogique : les télé et radios vont prendre le relais*. Polynésie 1: <https://la1ere.francetvinfo.fr/polynesie/continuite-pedagogique-les-tele-et-radio-vont-prendre-le-relais-823452.html>
- Gaible, E., & Burns, M. (2007). *Using technology to train teachers: Appropriate uses of ICT for teacher professional development in developing countries*. InfoDev | World Bank. <https://documents1.worldbank.org/curated/en/900291468324835987/pdf/396180infoDev01IN0TEACHERS01PUBLIC1.pdf>
- Gaudin, C., & Chaliès, S. (2015). Video viewing in teacher education and professional development: A literature review. *Educational Research Review*, 16, 41–67. doi:<https://doi.org/10.1016/j.edurev.2015.06.001>
- Gawi, E. (2020). Difficulties of teaching Saudi female students linguistic courses through educational closed-circuit television at Albaha University. *Arab World English Journal Special Edition on CALL*, 6, 394–408. <https://dx.doi.org/10.24093/awej/call6.26>
- Gibson, I., & Gibson, K. (1995). A window into the rural classroom: Interactive television and problem-based activity in Australian pre-service teacher education. *Journal of Information Technology for Teacher Education*, 4(2), 217–226. <https://doi.org/10.1080/0962029950040208>
- Hegarty, S. (2012, April 27). How soap operas changed the world. *British Broadcasting Corporation*. <http://bbc.in/1tn1mjJ>
- Heller, J., Daehler, K., Wong, N., Shinohara, M., & Miratrix, L. (2012). Differential effects of three professional development models on teacher knowledge and student achievement in elementary science. *Journal of Research in Science Teaching*, 49(3), 333–362. https://scholar.harvard.edu/files/lmiratrix/files/differential_effects_of_three_professional_development_models_on_teacher_knowledge_and_student_achievement_in_elementary_science_2012.pdf
- Hennessy, S., Haßler, B., & Hofmann, R. (2016). Pedagogic change by Zambian primary school teachers participating in the OER4Schools professional development programme for one year. *Research Papers in Education*, 31(4), 399–427. <https://doi.org/10.1080/02671522.2015.1073343>
- Inter-American Development Bank. (2009, January). *Brazilian soap operas shown to impact social behaviours*. Inter-American Development Bank News. <https://www.iadb.org/en/news/brazilian-soap-operas-shown-impact-social-behaviors>
- Jacobs, J. (2022, February 3). Broken lights, No glue: 'Abbott Elementary' has teachers talking. *New York Times*. <https://www.nytimes.com/2022/02/03/arts/television/abbott-elementary-quinta-brunson.html?smid=em-share>
- Jang, J. (2019). *Reimagining technology preparation for pre-service teachers: Exploring how the use of a video self-analysis instructional component, based on the ERDS model, impacts pre-service teachers' technological pedagogical content knowledge* [Dissertation, Syracuse University]. <https://surface.syr.edu/etd/1123>
- Karakaya, I. (2022, November 9). *Lao PDR: Advancing young children's learning through a TV series*. Global Partnership for Education | Education for All Blog. <https://www.globalpartnership.org/blog/lao-pdr-advancing-young-childrens-learning-through-tv-series>
- King Abdullah University of Science and Technology. (n.d.). *King Abdullah University of Science and Technology*. <https://www.kaust.edu.sa/en>
- Kizuka, M. (2019). Teachers, teacher educators and teacher education in the digital era: Future directions of continuing professional development and the way forward. *Journal of Sustainable Development Education and Research*, 3(1), 15–22. <https://doi.org/10.17509/jsderv3i1.17169>
- Korean Education Research and Information Service. (2011). *Adapting education to the information age* [White paper]. <https://www.keris.or.kr/main/cf/fileDownload.do?fileKey=59781bc0a9a2b35d17dd9ee071a5d074>
- Kornhaber, S. (2015, June 26). The modern family effect: Pop Culture's role in the gay-marriage revolution. *The Atlantic*. <https://www.theatlantic.com/entertainment/archive/2015/06/gay-marriage-legalized-modern-family-pop-culture/397013/>
- La Vanguardia. (2020, September 16). *RTVE estrena "HIT," serie sobre la educación en España, el 21 de septiembre*. La Vanguardia. <https://www.lavanguardia.com/vida/20200916/483515784022/rteve-estrena-hit-serie-sobre-la-educacion-en-espana-el-21-de-septiembre.html>
- Major, L., & Watson, S. (2018). Using video to support in-service teacher professional development: The state of the field, limitations and possibilities. *Technology, Pedagogy and Education*, 27(1), 49–68. <https://doi.org/10.1080/1475939X.2017.1361469>
- Mares, M.-L., & Pan, Z. (2013). Effects of Sesame Street: A meta-analysis of children's learning in 15 countries. *Journal of Applied Developmental Psychology*. doi:<http://dx.doi.org/10.1016/j.appdev.2013.01.001>
- Mayer, R. (2009). *Multimedia learning* (2nd. ed.). Cambridge University Press.
- Merkt, M., Hoppe, A., Bruns, G., Ewerth, R., & Huff, M. (2022). Pushing the button: Why do learners pause online videos? *Computers & Education*, 176(104355). <https://doi.org/10.1016/j.compedu.2021.104355>
- Mott MacDonald. (n.d.). *English in action*, Bangladesh. <https://www.mottmac.com/article/2372/english-in-action>
- Munoz-Najar, A., Sanzana, G., Grace, A., Amer, H., Cobo Romani, J., De Azevedo, J., & Akmal, M. (2022). *Remote learning during COVID-19 : Lessons from today, Principles for tomorrow*. World Bank Group. <http://documents.worldbank.org/curated/en/160271637074230077/Remote-Learning-During-COVID-19-Lessons-from-Today-Principles-for-Tomorrow>

- Naboya, J. (2022, March 15). *The 20 best TV shows about teachers*. TV Show Pilot. <https://tvshowpilot.com/fun-posts/best-teacher-tv-shows/>
- Navarro-Sola, L. (2021). *Secondary schools with televised lessons: The labor market returns of the Mexican Telesecundaria*. Human Capital and Economic Opportunity Global Working Group University of Chicago. <https://hceconomics.uchicago.edu/research/working-paper/secondary-schools-televised-lessons-labor-market-returns-mexican>
- Noetel, M., Griffith, S., Delaney, O., Sanders, T., Parker, P., del Pozo Cruz, B., & Lonsdale, C. (2021). Video Improves learning in higher education: A systematic review. *Review of Educational Research*, 91(2), 204–236. <https://doi.org/10.3102/0034654321990713>
- Ó Ceallaigh, T., & Ní Dhonnabháin, Á. (2015). Reawakening the Irish language through the Irish education system: Challenges and priorities. *International Electronic Journal of Elementary Education*, 8(2), 179–198. <https://files.eric.ed.gov/fulltext/EJ1085869.pdf>
- Peñuel, W., Pasnik, S., Bates, L., Townsend, E., & Hupert, N. (2009). *Pre-school teachers can use a media rich curriculum to prepare low income children for school success: Results of a randomized controlled trial*. Education Development Center and SRI International.
- Phalachandra, B. (2007). *Evaluation study of EduSat programme of Chamrajanagar (Karnataka)*. Department of State Educational Research and Training Government of Karnataka, India.
- Plata, G. (2022). *Educação à distância: O meu professor na televisão*. Inter American Development Bank: <https://www.iadb.org/pt/improvinglives/educacao-distancia-meu-professor-na-televisao>
- ReliefWeb. (2020, April 2). *How countries are using edtech (including online learning, radio, television, texting) to support access to remote learning during the COVID-19 pandemic*. ReliefWeb. <https://reliefweb.int/report/austria/how-countries-are-using-edtech-including-online-learning-radio-television-texting>
- Rey, G., Beege, M., Nebel, S., Wirzberger, M., Schmitt, T., & Schneider, S. (2019). A meta-analysis of the segmenting effect. *Educational Psychology Review*, 31(2), 389–419. <https://doi.org/10.1007/s10648-018-9456-4>
- RTV.es. (2019). *Las enseñanzas de "La otra mirada"*. <https://www.rtve.es/television/20190715/ensenanzas-otra-mirada/1972240.shtml>
- Sherin, M. (2004). New perspectives on the role of video in teacher education. In J. Brophy (Ed.), *Advances in research on teaching (Vol. 10): Using video in teacher education* (pp. 1–27). Elsevier.
- Singhal, A., Cody, M. J., Rogers, E. M., & Sabido, M. (2004). *Entertainment-education and social change: History, research and practice*. (1st ed.). Lawrence Erlbaum Associates.
- Smith, D. (2002, October). The theory heard 'round the world. *Monitor on Psychology*, 33(9), 30–37. <https://www.apa.org/monitor/oct02/theory>
- Snilstveit, B., Stevenson, J., Phillips, D., Vojtkova, M., Gallagher, E., Schmidt, T., . . . Evers, J. (2015). *Interventions for improving learning outcomes and access to education in low- and middle- income countries: A systematic review*, 3ie Systematic Review 24. International Initiative for Impact Evaluation (3ie). https://www.3ieimpact.org/sites/default/files/2019-01/SR24-education-review_2.pdf
- Statista. (2022, July). *Number of TV households worldwide from 2010 to 2026*. Statista. <https://www.statista.com/statistics/268695/number-of-tv-households-worldwide/>
- Tawney, R. (2019, March 22). *Was "I Love Lucy" ahead of its time?* Television Academy. <https://www.emmys.com/news/online-originals/was-i-love-lucy-ahead-its-time>
- The Economist. (2017, January 21). *The war on baby girls winds down*. <https://www.economist.com/international/2017/01/21/the-war-on-baby-girls-winds-down>
- The Economist. (2022, September 17). *I don't: Divorce among Arabs*. *The Economist*, p. 46.
- United Nations Children's Fund Latin America and the Caribbean Section. (2020). *Latin America & the Caribbean COVID-19 education response: COVID-19 impact on education in the Latin America & the Caribbean Region (LAC)*. <https://www.unicef.org/lac/en/media/14241/file>
- United Nations Educational, Scientific and Cultural Organization Institute for Statistics. (2016). *The world needs almost 69 million new teachers to reach the 2030 education goals*. UNESDOC Digital Library. <https://unesdoc.unesco.org/ark:/48223/pf0000246124>
- Wang, Y. (2000, March). *Providing teacher training through educational television: The China experience*. USAID's Advancing Basic Education and Literacy (ABEL2) Project. Educational Development Center and the Academy for Educational Development. https://pdf.usaid.gov/pdf_docs/PNACH453.pdf
- Watson, J. (2019). *The relationship between educational television and mathematics capability in Tanzania*. University of Cambridge.
- Westoff, C., Koffman, D., & Moreau, C. (2011). *The impact of television and radio on reproductive behavior and on HIV/AIDS knowledge and behavior*. DHS analytical studies No. 24. ICF International. <https://dhsprogram.com/publications/publication-as24-analytical-studies.cfm>
- World Bank. (2022, June). *School enrollment, tertiary, female (% gross-Saudi Arabia)*. World Bank. <https://data.worldbank.org/indicator/SE.TER.ENRR.FE?end=2020&locations=SA&start=2019>
- Zacharia, S. (2020, October). *Television education knowledge pack: With a focus on low-resource settings*. World Bank Group. <https://documents1.worldbank.org/curated/en/099005104142233123/pdf/P17425205bf126006093970142d904b2c93.pdf>

