Chapter 3: Televisually-based Distance Education

Overview

Seeing is believing; seeing is understanding; and seeing is learning. Teachers benefit when they see other teachers work in new ways, when they see another teacher use one computer with 40 students to promote collaboration, or when they see an innovation successfully implemented with the same types of learners and the same local context that they themselves face. Seeing other teachers in action offers credibility. It furnishes models of desired practice, provides implementation guidance, sparks ideas, and increases teachers' understanding of difficult-to-explain procedures or processes. To paraphrase a famous American baseball player, teachers "can observe a lot by watching."

This chapter focuses on televisual models of distance education for teachers. "Televisual" includes such visual broadcast media as television, video, and videoconferencing.

As a tool for teacher education, televisually based distance education is often used to show teachers real teacher-student interactions in the classroom, thus enabling them to observe the management of learning activities. In this respect the uses of radio and television for teacher professional development can be contrasted: whereas radio often is used to *guide* teachers through scripted activities, television *shows* teachers images of teachers and students in action (Gaible & Burns, 2007: 50).

Television

Though expensive, television has tremendous reach and enjoys the advantage of being a familiar and engaging visual medium. As such, television has for decades been well established as a distance education mode providing high-quality content and instructional techniques for pre-service, in-service, and continuing teacher education. Teachers have participated in television-based professional development in their homes; in their classrooms; or, in areas where television is not widely available, in viewing centers. Indeed, the largest distance education program in the world, Shanghai Television University, is television-based.[24]

Television's strengths include the power to engage viewers, to present conceptual information visually, and to show real people doing real things in environments both local and international. Television can support professional development by giving teachers opportunities to observe other teachers as they implement new instructional practices. By enabling teachers to anticipate what will happen, television reduces the risk inherent in experimentation (Gaible & Burns, 2007: 50).

As with radio, there is a large body of collective and cumulative evidence demonstrating that televisual formats of education (both television and video) can play an important role in facilitating learning. Studies (Saltrick, Honey, & Pasnik, 2004; Kothari & Takeda, 2000) suggest that educational television can assist with the following outcomes:

24 Shanghai Television University has approximately 200,000 students. For more information, see: http://www.shtvu.org.cn/index/index.htm (Mandarin).

- Reinforcing reading and lecture material
- Developing a common knowledge base
- Enhancing learner comprehension of a particular topic or procedure
- Helping learners visualize processes and procedures that might otherwise be difficult to understand via text or radio
- Increasing learner motivation and enthusiasm
- Promoting teacher effectiveness in areas targeted by television or video learning segments
- Augmenting reading skills, especially when used to reinforce the connection between the spoken and written word.

Figure 3.1: Instructional Television in China (Wang, 2000)

With its focus on economic development in the 1980s, China first turned to education as a mechanism to promote economic development. The 1986 Law on Compulsory Education guaranteed nine years of basic education for all children. This immediately increased the demand for more qualified teachers.

China has used television in a nationwide effort to develop the millions of teachers needed and upgrade their basic skills. Using a microwave network, China offers over 200 courses toward teacher diploma and subject-area certification. Because of its satellite technology, China has established the largest educational television network in the world: Central Educational Television provides a diploma in education to academically unqualified teachers, upgrades the professional skills of teachers, and conducts in-service management training for school principals. From 1988 to1998, 710,000 primary school and 550,000 secondary school teachers received diplomas in education through instructional television.

China has made its educational television broadcasts available on DVD. DVDs not only enable teachers to play back several hours of high-quality television, thanks to video compression techniques, but also allow them to stop, rewind, and view selected frames. Since an hour of video can hold 100,000 stills, this system offers enormous storage potential, allows for anytime-anyplace viewing, and can be shared among schools.

Television has been a common teacher training tool in countries that have well-developed broadcasting or satellite infrastructure (e.g., Cuba and the United Kingdom); cover a large geographical expanse (Canada, Australia, China, Mexico, Brazil, and the United States); and have large or dense populations that make television a cost-effective distance education model for teacher training (India and the United Kingdom). Globally, Canada, China, Mexico, and Brazil have been leaders in using television for teacher pre-service and in-service instruction. Canada also has a number of national and provincial teacher training broadcast programs.

In 1987 China, in order to upgrade the skills of the two-thirds of its teaching force who had not received appropriate pre-service teacher training, established the China Television Teachers' College to offer in-service teacher training through educational television. Within 10 years the number of unqualified primary school teachers had declined from 39 percent to 14 percent, and the number of unqualified secondary school teachers from 73 to 36 percent (Zhao, 1995, cited in Wang, 2000). China presently has

approximately 100 instructional television channels operating at both the national and regional levels (see figure 3.1 for more information about China's instructional television program).

Much of what is known about *instructional* television[25]—using television as an in-class education tool for students and teachers—comes from Latin America. For instance, Mexico's *Telesecundaría*[26] program is designed specifically to provide year-round curricula to rural junior secondary schools. Through in-class broadcasts, *Telesecundaría* enables college graduates with no training as teachers to guide students toward successful completion of the curriculum by supplementing educational programming with in-class discussion, lessons, and assessments. Instruction is delivered through text, the television, and teachers. The teacher uses materials and a script provided by *Telesecundaría* and often learns concepts simultaneously with his/her students through the broadcasts.

Each *Telesecundaría* lesson consists of a 15-minute televised program, followed by a 35-minute teacher-student dialogue, and a 10-minute break before the next segment begins. The televised program introduces a concept, and the students study relevant material in a specially designed *Telesecundaría* textbook. Students then engage in activities designed to apply the lesson to a practical situation, and the lesson closes with some form of assessment. The *Telesecundaría* model has been so successful that it has expanded to Costa Rica, Guatemala, Panama, Honduras, and El Salvador (Fillip, 2001; Calderoni, 1998; Santibañez, Vernez, & Razquin, 2005). In comparisons with their non-*Telesecundaría* counterparts in México, *Telesecundaría* students were "substantially more likely" than other groups to pass a state-administered ninth-grade examination and scored better in reading, math, and chemistry than students who studied these subjects via IRI and satellite courses respectively (Calderoni, 1998: 6). It is important to note, though, that *Telesecundaría* students perform poorly compared to students in brick-and-mortar schools in México (*Economist,* 2011b: 46).

México's Instituto Tecnológico de Estudios Superiores de Monterrey[27] (aka the Tecnológico de Monterrey or the "Tec"), a private, nonprofit university system, uses a variety of television formats for teacher education. Through its Virtual University,[28] the Tec offers postgraduate, continuing education, and training programs for teachers and teacher-educators in primary and middle schools via analog and digital television and Internet-based television, as well as through videoconferencing and Web-based learning.

The Programa de Actualización de Maestros en Educación program, funded by the Fundación Cisneros, Intel, and other private organizations, uses television, print, and the Internet to upgrade teachers' skills. At a predetermined date and time, teachers tune into a live broadcast on the day's topic from the Tec. As they watch the program, they can e-mail questions to the lecturer, who may respond live at that moment or

25 Though the terms "instructional" and "educational" television are often conflated, we distinguish here between the two terms. Instructional television is defined as broadcasts that simulate an instructional experience, with an instructor or narrator demonstrating procedures or explaining concepts. Educational television is used to refer to non-commercial television content that broadcasts programming for the purposes of educating or enriching viewers' understanding of a particular topic.

26 See http://telesecundaria.dgme.sep.gob.mx/

27 See http://www.itesm.mx/

28 See http://www.ruv.itesm.mx/

via e-mail at a later stage. Two thousand teachers from seven countries (Argentina, Colombia, Costa Rica, Ecuador, México, Panamá, and Venezuela) participate in this initiative through their DirecTV connection. Fundación Cisneros distributes television sets and DirecTV to all participating institutions. After the two-hour program, teachers can communicate via the website[29] in forums and discussion boards. Programs are aired for eight months, after which teachers must present a final project in which they demonstrate how they plan to improve their teaching. As part of this program, teachers also learn how to use a computer, e-mail, and the Internet in order to integrate these technologies into their classrooms and so that they can access the educational resources offered through the program's portal.

Cl@se is Fundación Cisneros' exclusive DirecTV channel, through which educational programming is broadcast directly into Mexican classrooms. Programs are aligned with the Mexican national curriculum and provide activities and ideas for teachers to continue exploring the topic after the program has been viewed. The program provides in-class support for in-service teachers, an especially crucial element for the many untrained and volunteer teachers in México's rural schools.

In Brazil, both private and public television channels carry educational programming that addresses vocational training and ways to improve classroom instruction. *Salto para o futuro*, broadcast by the government to address teacher professional development, is viewed by approximately 200,000 Brazilian primary and secondary teachers. The program's goal is to guide teachers in instructional change, but results are mixed. TV Futura's *A-Plus* is a daily nonformal private-channel television series used for continuing in-service professional development for teachers. Teacher follow-up is provided through local community mobilization networks, which offer extension activities around teaching practice.

On the other side of the globe, Indonesia's Channel 2 of TV Edukasi[30] (or TVE2), initiated in August 2008, is Indonesia's teacher education channel. Programs focus primarily on content and methodology and are broadcast to pre- and in-service teachers across Indonesia six days per week, eight hours a day to help teachers obtain an advanced degree and acquire advanced competencies. The Universitas Terbuka (UT) provides content and awards teachers credit. Typical teacher-based professional development using TV Edukasi involves watching programs, either in school or in one of UT's 37 learning centers, and reading print-based materials. Teachers then create a portfolio based on what they have learned. A local university tutor assesses this portfolio and sends the grade to UT, which confers credit on the teacher.

Egypt uses interactive instructional television to provide short-course in-service training for teachers at its 39 distance training centers across all governorates. Teachers can watch television programs and ask broadcasters questions via center coordinators. This technique of having teachers phone in questions that are then answered live on air is a format replicated in a number of countries that use television-based teacher training and is often referred to by the program designers as "interactive" television—though the degree of interactivity may be severely proscribed. As with TVE2, programs are considered interactive because teachers can respond in real time to the program by sending a short message service (SMS), e-mail or phoning the studio if the program is broadcast live (see figure 3.2 for a definition of interactivity).

29 See http://www.ame.cisneros.org

30 See http://tve.depdiknas.go.id/

In the United States, the Public Broadcasting Service (PBS) has been at the forefront of instructional television. Programs such as *French in Action*—a 52-episode French-language immersion program co-produced by Yale University and the PBS station WGBH—began in 1987. *French in Action* used a planned immersion approach to language learning in which students were exposed to authentic French language through a continuing storyline embedded with targeted grammar points, vocabulary, and culture. 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. 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 (such as the author of this guide). Though there has been no research on teacher learning using this instructional television mode, *French in Action* is marketed as an aid for both student and teacher learning.

Figure 3.2: Interactivity

Though frequently used, the term "interactivity" is often not defined. Broadly, interactivity includes the following features:

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

Nations such as Australia and the United States are perhaps better known for *educational* television offerings—a term that denotes general educational enrichment. The Australian Broadcasting Corporation produces and broadcasts a range of educational programs for the general public that include curriculum-based television and radio programming.[31]

In the United States public broadcasting programs such as *Sesame Street, Cyberchase,* and *Between the Lions* educate young learners in and out of preschool, kindergarten, and primary school classes. Each program is broadcast live and archived on videodiscs that come with a teacher's guide. *Sesame Street*, in particular, is a staple in many early childhood classrooms around the globe. The impact of these programs on children's learning has been extensively documented. For example, students who view *Cyberchase* are better able to solve more mathematically sophisticated problems than students who do not watch the program (Stansbury, 2008). Though such programs can plausibly be considered dual-audience direct-instructional programming, that is, teaching teachers as they teach students, research on the impact of these programs on teacher practice is difficult to find. There is some self-reported evidence by teachers from the Indian state of Karnataka that India's educational television program, *EduSat*, helps teachers feel more comfortable teaching certain types of content (Phalachandra, 2007). Teachers do report that educational television programming such as *Sesame Street,* in addition to multimedia and other video, provides them with ideas and strategies to be applied in their classrooms (Saltrick, Honey, & Pasnik, 2007; Center for Children and Technology, 2008) but such information on the impact of educational (versus instructional) television on teachers is typically anecdotal and has not been well researched.

31 See http://www.abc.net.au/learn/

Finally, in terms of television within the United States, cable television programming and, to a lesser, more local degree, community access television also broadcast general educational programming.

Though expensive, television still offers the broadest array of high-quality digital and analog content. Many nations, including the United States, have investigated the creation of a national, on-demand, online digital media service that would allow teachers to access public television's extensive archives of educational content free of charge. These resources could be repurposed for use in student education, teacher education, and adult learning (Stansbury, 2008).

Internet Protocol Television (IPTV)

Television as we know it is rapidly changing. The experience of watching television is fast becoming less time- and place-based, more personalized, and more platform-varied. In many countries, like the United States, the rate of television ownership is dropping as the "television experience" shifts inexorably to the World Wide Web via on-demand Internet streaming. Though this change is occurring everywhere, it is most pronounced in Asia, particularly in Korea, Japan, and Taiwan. In 2009 Indonesia began to distribute TV Edukasi via the Internet in a program called TV Online, through which television programming is offered 24 hours a day and can travel over minimum bandwidth speed of 256 Kbps.

As televisions connect to the Internet directly or through set-top boxes, Blu-ray players, and game consoles, there promises to be an explosion of offerings and formats that, though geared toward consumers in the short term, will undoubtedly impact television as a distance learning mode in the medium and long term. In 2010, both Apple and Google launched Apple TV and Google TV[32] respectively. Google TV is a software platform that allows users to download Internet videos as well as cable television programs and consolidate them all in the same place.[33] Google TV includes Google's search engine, so that viewers don't need to watch programs as they are broadcast, but rather can search for video content on their television or on the Web and then view it on their television, computer, or other mobile device at their convenience. Time-shifting technologies such as digital video recorders (DVRs) allow users to view television programs at a time of their choosing. In addition, 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.

In 2010 Britain's BSkyB introduced its Anytime+ service, which uses broadband to deliver on-demand programming. BSkyB also allows viewers to share the content of their DVRs. The British Broadcasting Corporation[34] (BBC) and other British broadcasters set up home box sets that unlock the online program stores (*Economist,* 2010). As this technology expands beyond U.S. and British borders, distance education providers may potentially search the Internet for appropriate topics for teacher education and call up this content to be viewed by teachers as part of a professional development offering.

32 Google TV has struggled since its inception but has since acquired hardware from other companies (such as Motorola), which may help to improve its television set-top box offerings.

33 To do this, Google TV requires an extra piece of hardware.

34 See http://www.bbc.co.uk/

In addition to expanding the amount of television content and allowing it to be stored and viewed in different ways, the Internet promises to make television more of a shared social experience, as opposed to a solitary one. Pay TV and cable television firms are building guides for mobile devices such as the iPhone and iPad that can be used to program DVRs. Samsung television sets currently contain iPhone-type applications that allow users to go straight to subscription film-streaming services and view television programs on their (Samsung) phones. Other providers are weaving social networking sites (e.g., Facebook and Google+) into television guides so that viewers can recommend shows to one another (*Economist,* 2010).

As an example, Boxee[35] is a media browser that users can purchase or design via a free software download. It allows viewers to save and stream programming that they can view on a smart phone, computer, or television and around which they can communicate, recommend programs, and watch programs with colleagues who live in different locations. Again, the implications of this type of convergence for professional development are potentially exciting: Teachers could order subscription professional development television programming via their cell phones, view content on cell phones or on a television, share the program with colleagues, and engage in online, real-time, facilitated post-program discussions via a computer or through their cell phones.

In a variation on television viewing, technology companies in South Africa are blending the platform of television with the services of the Internet. Vodafone's Webbox is a QWERTY[36] keyboard that plugs into a television through a standard RCA connector and runs an Opera[37] mini-browser over mobile networks. The Webbox allows users to access such online services as SMS and e-mail messaging, Internet searches, FM radio, and photo and music galleries. Viewers can access the Internet via a pay-as-you-go SIM card. Webbox even works effectively on older cathode-ray-tube televisions. Once users finish accessing the Internet, they unplug the Webbox, and the set functions again as a standard television.

For several years South Korea has been capitalizing on the convergence of the Internet and television to offer in-service professional development and continuing education to its teachers via Internet Protocol Television (IPTV)—cable-based, high-quality internet television. IPTV fuses broadcasting and telecommunications by providing multimedia content—such as various data, texts, graphics, video, and audio—as well as two-way communication. IPTV guarantees service quality by using ultra-high-speed Internet for Web TV and standard-definition content for high-resolution television screens. These characteristics of IPTV—its multi-channel content, customization of education services by level, high-definition video, and individualized reciprocity in various forms—make it a potentially powerful teacher education tool (KERIS, 2009: 12). Using IPTV, teachers can create "playlists" of professional development and education-related programming for viewing at their own convenience (KERIS, 2009: 12).

35 See http://www.boxee.tv/. XBMC, at http://xbmc.org/, is a more complex though customizable version of Boxee.

36 QWERTY refers to the first six letters (keys) in the top row, from left to right, of the most common type of computer keyboard layout in use.

37 See http://www.opera.com/

The Korean Education Research & Information Service (KERIS) and the Ministry of Education, Science and Technology are exploring uses of IPTV 2.0—customizable playlists on mobile devices with adaptable and three-dimensional media content—for use in both teacher and student education.

Figure 3.3: Video Case Studies

Video case studies involve a facilitated group of teachers who analyze certain components of a video of another teacher's practice. Video case studies are an attractive professional development option, since they allow teachers to see one another's classes. As digital recorders fall in price, computers become more common, and video editing software becomes easier to use, educational organizations may begin to build their own libraries of video case studies for teacher training purposes.

Video

Whether it is used to support students or teachers, recorded video offers numerous advantages over television as a mode of distance learning for teachers. Using videos, teacher training entities can re-use and control viewing and transmission schedules and control the rate of presentation through freeze-frame, pause, rewind, and other options, thereby enabling viewing to be interspersed with discussion or specific sequences to be repeated. Once confined to hard discs that could be mailed from one location to another, video technology now enjoys prominence on the World Wide Web. Sites such as TeacherTube,[38] School Tube,[39] Edutopia[40] and Annenberg Learner[41] contain numerous classroom and activity-based videos that, with the proper professional development and expert facilitation, could serve as in- and pre-service teacher education tools.

As a distance learning tool, video segments of classroom activities are commonly used to enable teachers to watch expert colleagues and also observe their own experiments with new instructional methods. Video case studies allow teachers to study a classroom or an instructional strategy, such as co-teaching, in depth, providing actual models of how a process should and should not work. A large percentage of instructors and students also believe that video adds to the quality of a course, improves understanding of content, and increases learner motivation (PBS & Grunwald Associates, 2010).

A number of supplementary tools and protocols support video as a teacher training tool. We briefly discuss two tools and one protocol here. First, Video Traces is a system that makes it easy to capture a piece of rich digital imagery, such as video or a digital photo, and to annotate that imagery both verbally and visually (using a pointer to record gestures). This functionality enables teachers and teacher educators to create "traces"—imagery plus its annotation that can be viewed by the creator, exchanged with others, and further annotated for a variety of teaching and learning purposes.[42] However, Video Traces appears to be still in its formative stages.

38 See http://www.teachertube.com

39 See http://www.schooltube.com

40 See http://www.edutopia.org/

41 See http://learner.org

42 For more about Video Traces, see the Program for Educational Transformation Through Technology at the University of Washington. Retrieved from http://depts.washington.edu/pettt/projects/videotraces.html

Next, on the World Wide Web, where video is increasingly stored and viewed, VoiceThread,[43] a free, collaborative multimedia space, allows teachers to post still and moving images and view and comment on video in real time or asynchronously, using a microphone to record comments, type comments, or phone in comments. EDC's DBE 2 project in Indonesia, funded by USAID, used VoiceThread extensively as part of a program to help Indonesian educators to become school-based coaches. Coaches uploaded video of their classroom work with teachers and met with four-person learning teams who provided synchronous feedback and guidance on this work.

Figure 3.4: Evidential Reasoning and Decision-Making (Receso et. al., 2009)

Step 1: Identify a Focus. Teachers choose a focus. This can range from micro-level concerns such as how to individualize instruction for a struggling student to macro-level issues such as how to manage the classroom with 40 students and one computer. In a pre-observation conference with teachers, a teacher support person helps teachers identify a focus for the classroom observation.

Step 2: Collect Evidence. Teachers then identify and collect evidence that is directly or indirectly associated with their focus (e.g., lesson plans, video recordings, student work, etc.)

Step 3: Look Through a "Lens." Teachers then select a lens through which to collect, filter, analyze, and interpret evidence. A lens is a protocol to amplify fine-grained attributes of practice while eliminating unrelated "noise." A support person (e.g., a coach) can guide the interpretation of evidence through the use of lenses, which provide a specific perspective to highlight and analyze specific aspects of teaching.

Step 4: Enact a Course of Action. Following the lens-aided analysis, teachers synthesize what they have discovered about their particular behavior (step 1) into a course of action. They then enact that plan and repeat this process in an ongoing manner to improve specific aspects of their practice. The support person helps the teachers do this.

Finally, Evidential Reasoning and Decision-Making (ERDM) is a four-step, video-based method of collecting, analyzing, interpreting, and acting on classroom practice (Recesso, Hannafin, Wang, Deaton, Shepherd, & Rich, 2009) to enable teachers systematically to capture, identify, analyze, and adapt their practice. See figure 3.4 for a full explanation of ERDM.

There are numerous examples of using video to instruct teachers in improving their pedagogical practices. The University of Michigan's Elementary Mathematics Laboratory places two video cameras in the classrooms of master mathematics teachers. While the master teacher works with struggling math learners to uncover their mathematic reasoning, a group of novice mathematics teachers observes the live video in another location.

In sub-Saharan Africa and South Asia, video has been used effectively to aid teachers grappling with new teaching modes. In 1996, schools in Lesotho demonstrated techniques to help teachers integrate disabled

43 See http://voicethread.com/

students into regular classes in a video series produced by Save the Children. The series of 13 videotapes, each about 15 minutes long, guided teachers through identifying physical and cognitive disabilities; helping children overcome them; and ensuring that the classroom remains a safe, equitable, and welcoming environment (Gaible & Burns, 2007: 56–57).

Video has been successfully employed in rural Nepal to improve teachers' instructional skills (Pouezevera & Khan, cited in UNESCO, 2007). USAID's Basic Education Support 2 program in Namibia tasked circuit inspectors with videotaping teachers' classrooms to enable observation and assessment. *Stratégies Intégrées pour une Education Equitable et de Qualité* (SIEEQ) in the Democratic Republic of Congo used video as part of a program of intensive follow-up support for teachers. When a SIEEQ team traveled to a project school, they brought a digital video camcorder and a laptop. They filmed teachers working with students, uploaded the video to the laptop, and then shared it with the teachers as in-class professional development.

In the above examples teachers viewed videos of teaching practice to improve their own instructional skills, but video need not involve teaching episodes to be an effective professional development tool. From December 2004 to June 2005, the Discovery Channel's Global Education Partnership Learning Center project provided 371 teachers and 18,000 students in hundreds of Namibian schools with a satellite dish to allow teachers to download prerecorded science, history, and geography videos and show them to students in a learning center equipped with a television and DVD player. Each video was accompanied by a printed teacher's study guide that walked the teacher through the video. The guide included scripts and 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 is unavailable, teachers reported[44] that they found this form of structured, dual-audience, direct instruction quite helpful, claiming that the videos helped them learn content better and that the guide helped them teach it more effectively.

Like audio and print, video has blended well with the World Wide Web. The Web has made video more flexible, while video has added value to the Web itself. Because of this convergence, video can now be used for more personalized instruction, while also reaching a potentially mass audience. For instance, at New York University[45] and Carnegie Mellon University,[46] many lecturers videotape their class lectures and post them online for students to access. This system not only allows students to view videos at their own convenience but also, more critically, frees the lecturers up to use class time to offer more personalized, one-on-one instruction—a process sometimes referred to as "flipped teaching"—or to offer greater computer-based support (Parry, 2010).

Video can also be packaged on websites as professional development toolkits for teachers, teacher-educators, and principals. Three good examples of this are Success at the Core,[47] a Web service dedicated to

44 June 2005 author interviews with teachers in Caprivi, Namibia.

45 See http://www.nyu.edu/

46 See http://www.cmu.edu/

47 See http://www.successatthecore.com/

building school-based leadership teams and quality instruction. Professional development occurs almost entirely via multiple free videos—some of which function as mini-case studies and others as step-by-step guides—as well as accompanying print protocols and reflective activities. A second example is the TIMSS Video Study[48] site, which provides videos of math and science classes from around the globe, as well as numerous documents about teaching mathematics and science.

Finally, Teachscape.com is a commercial Web-based teacher development system that offers teachers access to annotated video cases and subject courses. Each lesson has multiple video clips of exemplary teaching in a specific subject and topic—such as weight and density in science—and includes sample lesson plans, learning activities, student work, and guides for assessing student work. Teachscape is designed to provide teachers with observations of exemplary teachers in action. It uses video clips selected to illustrate specific points.

Video used to be difficult to find but is increasingly easy to access and develop. Video of classroom practices can be acquired from many universities and private companies, often via Internet download. Such videos are designed to achieve specific objectives in specific contexts, however, and may not be appropriate for use in all contexts. Examples of teaching videos can be freely accessed, downloaded, and stored on DVDs using any number of free tools via YouTube,[49] Teacher Tube, My Learning Tube,[50] and School Tube,[51] in addition to in-country repositories of video. Through the prevalence of increased Internet bandwidth, inexpensive but fairly robust pocket video recorders, and online services to compress and stream video, users can create their own streaming video for use on computers, phones, and tablets. For example, a face-to-face professional development session or lecture at a teacher training college can be recorded live and streamed live (via a free Internet video service such as UStream).[52] Similarly, users can record video using a pocket video recorder or video-enabled cell phone and use the increasingly easy video editing tools that come with pocket recorders or with a PC (MovieMaker) or Mac (iMovie) to create their own teaching videos. These videos can be made more interactive by inserting a slide/still of discussion questions or group activity assignments, which can then be projected on a wall using a mini-projector such as the Pico or Acer's micro-projector.

Videoconferencing

Videoconferencing (or video-teleconferencing) is a set of interactive technologies that allow individuals in two or more locations to interact via full-motion, two-way video, and audio transmissions simultaneously. Videoconferencing can take place through high-end dedicated systems (consoles and remote control video cameras) such as Polycom's Converged Management Application and Cisco's Telepresence[53] system, which

48 TIMSS is the Trends in International Mathematics and Science Study. See http://timssvideo.com/

49 See http://www.youtube.com

50 See http://www.mylearningtube.com

51 See http://www.schooltube.com

52 See http://www.ustream.tv

53 At this point in time, Telepresence systems cost about $100,000.

use multiple video cameras and high-definition screens, or via low-end Internet-based desktop systems, such as TeamViewer[54] or Skype, in which participants communicate via a built-in or external computer Web camera.

Videoconferencing is a powerful distance education option, since it approximates face-to-face interactions at a distance. The Canadian province of Alberta uses videoconferencing extensively as a mode of distance learning for teachers. In professional development projects like the U.S.-based Teachers' Telecollaborative Network (2001–2002), teachers in one location collaborated in group-based activities with teachers in another. Teachers were able to see their colleagues and instructors remotely, discuss topics with them at length, participate in learning experiences that might otherwise have been inaccessible, and view live examples of the types of instruction they should and should not be doing.

Since teachers can hear and see one another and observe important nonverbal cues (like gesturing) and tonal cues, there is evidence that videoconferencing can mitigate many of the misunderstandings that emerge in online learning. But teaching a remote audience via videoconferencing is still not the same as teaching a "live" audience. There are often lags in audio; picture and audio quality may be poor; it may be difficult to see all remote learners (or for remote learners to see the instructor); video can drop, leaving remote learners stranded; it may be hard for the videoconference teacher and remote teacher to coordinate activities and timing; certain activities work poorly or not at all across distance; and videoconferencing, like television, often doesn't capitalize on the benefits of the medium, instead defaulting to "talking head" instruction. Finally, if the videoconferencing instructor is working with both a live physical audience and a remote audience, he or she may focus on the live audience to the exclusion of the remote audience—or vice versa.

These issues notwithstanding, videoconferencing is a powerful distance education medium that can serve multiple purposes. In Indonesia, videoconferencing is used for *group meetings* as part of the blended, residential teacher-upgrading program, HYLITE. As part of the USAID-funded, EDC-administered DBE 2 program, coaches in an online learning program used the free remote access software TeamViewer to *co-teach* a one-computer activity with teachers in remote schools. Washington State University's cyber mentoring program, a collaborative venture between the university and K–12[55] schools, uses high-end videoconferencing so that pre-service teachers can *tutor students* in course content, literacy, and communication skills. This system allows for interaction between school sites, even at great distances, and facilitates the creation of partnerships between remote sites while still maintaining many of the facets of face-to-face communication crucial for quality educational experiences (Johnson, Maring, Doty, & Fickle, 2006). In the rural U.S. states of Oklahoma and Iowa, many pre-service teachers use a Polycom system to do *formal observations* of experienced teachers in their classrooms. And in many distance education programs, teachers participate in *university lectures* and seminars via videoconferencing.

The biggest issues facing videoconferencing are technical and financial. Videoconferencing demands very high two-way transmission of full-motion video and high-quality audio. When one or both of these fails

54 See http://www.teamviewer.com/

55 K–12 is a U.S. term that refers to kindergarten until grade 12 (the end of secondary school).

or is interrupted, or when the network is congested, teaching and learning are compromised. Poor audio quality, unclear images, and lags and interruptions in communication from one site to another undercut the whole rationale for videoconferencing: "being there" with fellow distant learners. High bandwidth is expensive, and more effective types of transmission such as microwave Wireless Wide Area Network (WWAN), along with the best videoconferencing systems, may be unavailable or beyond the budgets of many distance education institutions.

However, the future for videoconferencing as a much more widespread distance education tool is quite promising. Free desktop video applications like TinyChat[56] and Google Chat[57] make videoconferencing much more accessible to teachers. The use of bandwidth conservation and re-allocation mechanisms such as Quality of Service (QoS) allow institutions to set desired levels of service for different types of traffic on a network, thereby potentially allocating a higher QoS to videoconferencing and eliminating many of the transmission problems that occur using this method.

Finally, in a variation on simple videoconferencing, the use of "virtual bug in the ear" (VBIE) technologies, a Bluetooth-enabled earphone, can provide teachers with real-time coaching at a distance. A remote coach observes the teacher via a high-definition Web camera and provides the teacher with live coaching assistance via Skype. The information is communicated directly to the teacher's earpiece, so only the teacher hears—students don't. The teacher can thus make the improvements in practice or in a lesson suggested by the coach immediately. Further, using a video-based call-recording system such as Pamela or CallGraph, these VBIE sessions can be saved as electronic video files, and the teacher and coach can view them together after the class (Rock, Gregg, Gable, & Zigmond, 2009).

Considerations: Television and Video as Distance Learning Tools

Television and video possess numerous strengths as a medium for teacher education. Like radio, television is a mass communication medium with extensive reach; it is a technology with which teachers are familiar, thus requiring little training; and programs can be recorded and rebroadcast to teachers at their convenience. If produced well, television and video can be an engaging medium for learning content, procedures, processes, modeling techniques, and strategies that are difficult to present in either print or via radio.

A real strength of television and video is that they combine words and moving images. Moving images serve as powerful shorthand for communication and are an engaging and familiar cultural and professional communication medium. Images are concise—several pages of text can be encapsulated by a brief video segment, and conceptual, abstract information can be made concrete. A video can unfold in a nonlinear fashion, whereas nonlinear text sometimes proves disorienting to the reader. Because video is a dual-channel (aural and visual) learning approach, as opposed to a single-channel approach such as print and radio, the involvement of both aural and visual memory may result in greater long-term retention of information (Mayer, 2001). The use of video, particularly as part of an online or Web-based course,

56 See http://www.tinychat.com

57 See http://www.google.com/chat

lessens the reliance on print-based learning, thus enhancing the accessibility of whatever distance learning medium is used. Most important, television and video can blend multiple media—still images, moving images, and sound—to offer teachers a more multimodal learning experience than either print or audio.

Thus, televisually based technologies—television and particularly video—hold tremendous potential as media for and components of any distance learning program. The decreasing cost and increasing ease of video-editing tools means that video examples can be captured and edited locally and used for teacher self-study, case studies, and group study—all of which can then become the basis of discussion and analysis. Videos can be archived and viewed in multiple formats—via the Web, video compact discs (VCDs), television, smart phones, or tablets. New video cameras offer 360-degree image-capturing capabilities that can be transmitted over the Internet to provide a panoramic classroom view. Videoconferencing can bring isolated teachers into synchronous conversations with a larger community, which can be enormously beneficial, particularly if a well-trained facilitator ensures productive and focused discussion around the video examples.

However, as teacher education tools, television (in particular) and video suffer from a number of inherent and exogenous weaknesses. Television has extremely high initial production and recurrent costs and demands an extensive distribution network and highly skilled personnel. Broadcasts can be interrupted for a number of reasons: electrical, technical, programming, or political. Broadcast schedules may not be convenient for teachers, though this problem can be eliminated by using recording devices such as videocassette recorders (VCRs) and DVRs. Much instructional television and video fails to capitalize on the medium, instead falling back on traditional talking heads. It is often difficult to create engaging instructional television or video programming; and locally produced video, in particular, is often too long, of poor quality, or lacking narration. Finally, in the case of in-class television broadcasts that are more broadly educational, rather than directly instructional (that is, directly involving the teacher) in nature, television may be used to "babysit" students as teachers leave to smoke or visit with friends (as the author observed with EduSat programming in India).

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

- Using many of the same techniques as used in IRI (pausing, questioning the audience, reinforcement, and guiding and scaffolding the teacher)
- 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 e-mail, two-way audio, telephones, and cell phones (either voice or SMS) to create interactivity between viewers and presenters, viewers and content, or among groups of viewers in different locations
- 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 YouTube, Vimeo,[58] School Tube, and Teacher Tube)

58 See http://www.vimeo.com

» Developing instructional video (narrated short video segments, interspersed with places for facilitated group discussions, individual reflection, large-group processing, and assignments)

Summary of Televisually-based Distance Education

Figure 3.5 summarizes the role of televisually based distance learning and its strengths and limitations as a distance education mode.

Figure 3.5: Summary of Televisually-based Distance Education Model (Adapted from Gaible & Burns, 2007: 53)

Roles in Teacher Professional Development	Strengths	Limitations
▪ The medium delivers content and concepts to learners across the curriculum. ▪ It develops teachers' skills and knowledge. ▪ It provides views of real classroom practices and learning activities. ▪ It provides teachers with learning resources that show distant places, graphical representations of concepts, historical events, etc. ▪ It visually demonstrates difficult-to-understand concepts such as instructional or assessment strategies, communication strategies, and content-based procedures. ▪ It demonstrates new modes of teaching and learning through views of real classroom activities. ▪ Videotaping classes shows teachers their own interactions, habits, and progress toward effective teaching. ▪ Video-enabled cell phones and portable video recorders allow distance education instructors and teachers to record, display, and study video examples of actual classrooms.	▪ The medium is both powerful (moving images, audio, etc.) and familiar. ▪ It 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. ▪ It can reach large populations of students and teachers. ▪ It addresses equity and access issues—although access requires electrical power. ▪ It supports instructional continuity across grades and subjects. ▪ All computers are equipped with video-editing software, so video can be produced inexpensively and without a lot of production expertise. ▪ Teachers benefit from seeing other teachers—and themselves—in action. ▪ Video recordings can be used and re-used according to teachers' schedules. ▪ Playback controls (rewind, freeze-frame, etc.) enable close analysis of specific events.	▪ Visual medium could, but typically does not, guide teacher through scripted, hands-on classroom activities. Unlike radio, television and video promote "watch and learn," not "do and learn." ▪ For television and commercial video production, high development costs may limit testing, review, and revision before programming is launched. ▪ Value of content may degrade over time—costs of revisions and new programming are high. ▪ Television broadcasts may be subject to external political and economic disruptions. ▪ Television production requires sophisticated skills and facilities. ▪ Access to electrical power and, in the case of Web-based video, high bandwidth are both required. ▪ Internet television demands robust, high-speed Internet connectivity. ▪ Individually or locally produced video may be of such inferior quality that it turns off potential learners.

Roles in Teacher Professional Development	Strengths	Limitations
	▪ Video production tools can be used locally—in schools, by ministries, etc. ▪ Fixed broadcasting schedules can be made more flexible through DVRs (like TiVo) and VCRs. ▪ Development of new gaming consoles (like the Wii) and apps for smart phones and tablets extend television's reach and functionality.	▪ Video produced by foreign institutions may be ineffective—teachers may not identify with or reject experiences shown outside recognizable contexts. ▪ Over time, the technical quality of video fades and content may look, sound, feel, and be outdated. ▪ Increasing evidence shows that declining attention spans mean that teachers "tune out" 30- or 15-minute broadcasts.