

Using Contemporary Technology Tools to Improve the Effectiveness of Teacher Educators in Special Education

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Abstract

Ongoing developments in educational technology, including web-based instruction, streaming video, podcasting, video-conferencing, and the use of wikis and blogs to create learning communities, have substantial impact on distance education and preparation of special educators in rural communities. These developments can be overwhelming, however, for teacher educators reluctant to break away from traditional methods. Rather than lamenting the burden of ever-changing technology, the authors highlight technology tools that make the efforts of teacher educators in special education more effective, looking at the positive elements of technology in teaching in higher education and offering a proactive perspective on technology integration.

As we begin teaching "digital natives" (Prensky, 2001a) in our college classrooms, teacher educators are facing technology advances that challenge our ability to keep pace while simultaneously working with a new generation of learners. In recent years, teacher educators have witnessed the rapidly increasing impact of computing and web-based technology in its various forms on instructional methods in both the K-12 and the university classroom. Parallel to this proliferation of instructional technology over the past few decades has been the rapid expansion of distance education programs that have substantial relevance to teacher educators preparing special educators in rural or remote communities (Spooner & Lo, 2009). Many teacher educators involved in this transition may feel bombarded by the trends toward web-based learning and the ongoing arrival of a younger techno-generation of students whose expectations for engagement via multi-media technology in a lesson exceeds earlier generations (Prensky, 2001a, 2001b).

It is widely recognized that technology is rapidly transforming education. Online enrollments have been growing at a rate substantially greater than overall higher education enrollments and are showing no signs of slowing (Allen & Seaman, 2007). The growth of online learning opportunities, coupled with the increasing availability of an array of digital media, is changing the landscape of education and the

expectations of learners entering institutions of higher education. Engaging these media hungry students while continuing to offer the highest quality education and teacher education relevant in a digital age is a challenge faced by colleges of education everywhere but particularly in those institutions serving students at a distance that require online and hybrid offerings out of necessity rather than preference.

The implications of these cultural/generational changes may contribute, at least in part, to the rapid change in instruction at the university level. Often left out of the equation are the needs and preferences of teacher educators (typically from a less techno-savvy background) burdened by a steep learning curve to keep pace with changing norms (Ludlow, 2001; Meredith, Schewe, Hiam, & Karlovich, 2002). Generational change is paralleled with changes in technology usage to the point that being techno-savvy is virtually a prerequisite to success in modern society. The generations serving as teacher educators in special education (primarily Baby Boomers and Generation Xers), while often exposed to technology like basic computers, lacked more sophisticated technology use in their own classroom learning experiences. However, the current younger generation of college-level learners (i.e., Generation Y or Millennials) were born and raised with computer technology (Meredith et al., 2002; Prensky, 2001a). Computers have always been a part of

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their lives in some way. Today's youth are often even referred to as Generation M, the Media generation (Rideout, Roberts, & Foehr, 2005). A clear "digital disconnect" between students' use of technology in and out of school also has become evident (Levin, Arafeh, Rainie, & Lenhart, 2002). It seems that the younger generation of learners has grown up with "sensory overload." They have been exposed to fast-paced media and bombarded by information all their lives. Hence, it becomes more challenging to develop engaging and effective lessons for these students based on a traditional model of teaching (Prensky, 2007). Clearly, the younger generations of learners have had an ever-increasing exposure to computer-related technology as the use of this technology continues to flourish. This has been seen most clearly in the rapid increase in online instruction in recent years (Allen & Seaman, 2007; Brown, 1997).

Cradler (1994) reported outcomes for students and teachers related to technology which suggested that the effectiveness of technology was a function of the instructional content and strategy delivered by the technology. In Cradler, Freeman, Cradler, and McNabb's (2002) review of the research, it was suggested that, from the student's perspective, the use of multiple technologies in classrooms increases performance, opportunity, attitude, and problem-solving skills, especially when interactivity is prominent. In a similar study by Cradler and Bridgforth (1996), the authors suggested that educator use of technology resulted in a high increase in individualized instruction, teaching, productivity, and collaboration. Technology supports our work and makes us both effective and relevant to contemporary learners, broadening our potential to support teacher education candidates and improve our own productivity (Lessen & Sorensen, 2006).

Various examples of computer-related technology exist that have become routine additions to contemporary education practice. Some examples include the use of:

- PowerPoint presentations;
- video tapes and DVDs to show visual examples of subject matter being studied;
- computer-based instruction (computer software) wherein students can practice basic skills or develop problem solving skills;
- online or web-based learning which enables students to view web modules online and complete activities to facilitate learning from any location without the presence of the instructor;
- streaming video/audio which allows students to view video or camera feeds of lectures or anything else than can be filmed either live or on demand on the World Wide Web;

- wikis as an instrument to enhance a learning community by giving students the capability to edit information;
- blogs as a tool to create interactive learning communities.

As each new trend develops, university faculty feel increasing pressure to keep up with what might be perceived as the latest fad.

The purpose of this paper is to offer a proactive perspective on technology integration, highlighting technological advances that improve our overall effectiveness with the current generation of learners. Rather than lamenting the burden of ever-changing technology, the authors will highlight technology tools that can advance the goals of teacher educators in special education, looking at the positive elements of technology integration in teaching in higher education. In some cases, these technologies might even make life easier for teacher educators.

Case in point, although many novice researchers struggle to develop proficiency with statistical analysis programs like SPSS, few of them would prefer to perform long and tedious hand calculations. Consider also the lengthy and inefficient process of matching internal citations with reference lists when producing a teacher preparation grant for the Office of Special Education Programming. For several years, citation management systems like Endnote have eliminated the need for this time-consuming process by providing a "cite while you write" option in Microsoft Word that automatically generates a reference list for any internal citation added to the document (see <http://www.endnote.com/> for more information). Focusing on how technologies can make us more productive includes the need to be critical in our selection.

Changing Times

Accessing the minds of students today has to be done in a way that presents information with a variety of media and offers the opportunity to express information in a variety of ways. New tools that incorporate the use of information and communication technologies as part of the learning environment are crucial in moving in a positive direction in 21st century education (Learning for the 21st Century, 2002). Technology is at the center of learning and interactions with information for a typical 21st century learner (Oblinger, 2006). Using emerging technologies and Web 2.0 tools, teachers and students can be active contributors in teaching and learning, providing a clear path for collaboration, creativity, and ultimately, engagement.

Often, when confronted with rapid advances in computer technology, many in university settings attempt to weather the changes with hopes the fad will fade away; however, the integration of computer

technology into our daily lives is unlikely to diminish in the coming years. To be successful amidst these changes, teacher educators should actively engage technology in their professional work. Although computer technology does not necessarily have innate merit, efforts to align tools with potential professional growth are vital. Rather than seeing these tools as “one more thing,” the authors will provide an overview of meritorious technology tools and a short *case application* for each example demonstrating their usefulness to teacher educators. In some instances, technology development at the start might seem time-consuming, but often the initial investment ultimately will result in a more efficient use of time (e.g., creating and archiving a digital video of a live lecture and then using that archived lecture for ongoing access in an online course). Some specific tools and programs to be discussed include podcasting, streaming video, multimedia creation with streamlined software like iMovie and Final Cut Pro, web-based video-conferencing, wikis, and blogs. Further, these tools, along with supplemental materials, can be integrated easily into a daily routine, allowing more students access to learning.

Applications of Technology in Teacher Education for Special Educators

Teacher Education in Web-based Learning Environments

While Web-based instruction (WBI) has grown at a rapid pace in universities across the country (Carr, 2000; Charp, 2002), there is concern that this development has taken place without expert preparation or knowledge of the process (Ferdig & Hartshorne, 2002; Lynch, 2002). Also, there are concerns regarding the integrity of teacher preparation curriculum and that the amount of interaction with

future teachers is limited (Hines & Pearl, 2004). While the debate over the effectiveness and appropriateness of instructional technologies in teacher education programs will likely continue for an extended period of time, it is generally accepted that technology has a number of pedagogical benefits (Norman, 1993). This is supported by examining the amount of money being allocated by various government and educational agencies toward the use of educational technologies in teaching and learning; the development of local, state, and national mandates and standards for students, teachers, and administrators focused on the use of technology in teaching and learning (e.g., No Child Left Behind, Preparing Tomorrow's Teachers to Use Technology [PT3], the International Society for Technology in Education [ISTE]'s National Educational Technology Standards [NETS], etc.); and the growing body of research citing various pedagogical benefits of technological applications and WBI (Dusick, 1998; Dwyer, 2002; Glendinning, 2002; Johnston & Cooley, 2001; Jonassen, 1996; Kubala, 1998; Rice, 2001). These issues, coupled with the limited technological experiences integrated in many preservice teacher education programs (Milken Exchange on Educational Technology, 1999), make the integration of effective and appropriate WBI in preservice teacher education programs increasingly important.

Case 1: Web-Based Instruction in Special Education Teacher Education

Synchronous chats in online courses: Improving communication via web chat rooms. One possible solution for creating “real time” experiences for learners online is synchronous or “live” chats. These chats provide opportunities for more Socratic discussions than are typically offered in the

Figure 1.

Chat Protocol for Synchronous Interactions.

1. If you have a question, do not type the question and send it! This causes chaos as we all begin answering/asking questions and is confusing for the reader. Instead, if you have a question just type a question mark (?) and send.
2. Use an exclamation point (!) to signal that you want to make a point.
3. Your name will appear on the screen with a question mark or exclamation point, and I will “call” on you. This will help keep a little order.
4. Please do not make extraneous comments when others are “speaking”. Again, it gets really confusing. Use the ? or ! system.
5. Do not wait to hit return until you have typed your complete question or point. Instead type four or five words and then hit return.
6. Save questions that are not related to the topic until after the official chat. At that time, other students will have the opportunity to sign off and I will remain online to answer individual student questions.

asynchronous format. Socratic questioning fosters critical thinking, evaluation, and knowledge application. This critical element of the teaching/learning process is difficult to replicate in asynchronous chats. Hines and Pearl (2004) proposed a *Chat Protocol* that promotes synchronous interactions while alleviating some of the management issues associated with these chats. The protocol is posted on the course website for students to follow while participating in synchronous chats (see Figure 1).

In addition to the protocol, professors in real time situations can ask questions with didactic responses (yes/no, true/false) and require all students to respond. These types of questions call for students to pay attention to the chat and to be accountable for the content. Socratic questions can be asked with learners instructed to give a one-sentence response. The responses appear quickly, and it keeps the screen lively without overlapping conversations. This type of interaction draws more from students and allows the instructor a better idea of where the students are with course content. Also, this type of interaction calls for students to think and respond quickly—traits that are used daily as classroom teachers.

Multimedia Development and Streaming Video in Teacher Education

Streaming video has been a significant development in the enhancement of web-based learning experiences. Streaming video involves an audio/video presentation that can be “broadcast” to a computer via the Internet and provides a continuous feed of video information either pre-recorded or live rather than downloading a large video file (Mortensen, Schlieve, & Young, 2000). Streamed video can be particularly beneficial for non-traditional learners due to flexible accessibility (Ludlow & Duff, 2002) and relates well to a younger generation of learners. Cofield (2002) found that college-age students found the use of streaming video to be superior to the use of static images and overall more engaging. More significantly, the students reported streaming video to be a better fit for their learning style (Cofield, 2002).

Interactive video is the term typically used in the literature to refer to computer-based video that allows the learner to interact with the media (i.e., stopping to read overlaid text, replaying segments). Rather than passively viewing an instructional video on television or in class with an instructor playing clips, interactivity indicates the learner’s ability to control the video and monitor his/her own learning (Wetzel, Radtke, & Stern, 1994). Although technologies change over time, the interactivity of video in most studies is comparable to the level of interactivity involved in a web-based course using streaming video. Numerous meta-analyses, predating contemporary tools, exist in the

research literature indicating positive effects of interactive video, including at least moderate effect sizes when compared to traditional instruction (Bosco, 1986; McNeil & Nelson, 1991; Fletcher, 1989; Fletcher, 1990).

Everyone is joining in on the video craze, with production and dissemination easier than ever on sites like YouTube, Myspace, and ustream.tv, which allows live video streaming for free. Even elementary-aged children are invited to upload video to become a part of ME:TV (<http://www.nick.com/metv>), a show on a popular children’s cable network. Students simply upload a quick clip of themselves doing something of interest, and they may end up on television.

Using video for courses may well become the norm, so creating quality clips for streaming is a practical use of time in the digital age. Before starting a project, however, it is important to determine whether there is already something similar available online. Many times, a quick search will reveal great video clips already available that you could link to an online course. In fact, marketing of existing multimedia may be a major limitation of the current efforts of teacher education for special educators. Numerous excellent multimedia sites already exist for public use. Why reinvent the wheel? Linking to existing video and writing key questions or activities around such sites provides learners the same opportunities that creating the file from scratch would allow. *Project Mainstep* (<http://jabba.edb.utexas.edu/mainstep/ms/index.cfm>), developed by special education faculty and doctoral students at the University of Texas at Austin with funding from the Office of Special Education Programs, provides multimedia examples and modules in the areas of prereferral intervention, managing and assessing problem behavior (e.g., FBA), reading fluency, math interventions, and social skills. Possibly better known is the extensive collection of resources available from the IRIS Center at Vanderbilt University. The IRIS Center website (<http://iris.peabody.vanderbilt.edu/>) provides modules on virtually every significant topic in special education, including collaboration among professionals, implementing Response to Intervention (RTI) models, using learning strategies, and many other topics. Even K-12 teachers are getting into the habit of developing instructional video and multimedia models, uploading them to the YouTube for teachers known as *TeacherTube* (<http://www.teachertube.com/>).

Questions to consider before creating a video for the web or specifically for teacher education courses include:

1. Are consent forms needed? If so, are they on file?
2. How will closed captioning be provided to provide full accessibility?

3. Is the planned length of video appropriate for learner attention span? Short clips are more effective.

Developments in video production software (e.g., Apple's *iMovie* and *Final Cut Pro* or PC equivalents like *Windows MovieMaker*) allow for digital video to be imported to your computer, edited, and exported as a finalized product like streaming video or a DVD using a very simple interface in which you drag clips and order them as you wish.

Case 2: Streaming Video

Using video weekly in online courses. A simple use of video to provide a face-to-face feel in an online course is to use a webcam to record a short, simple weekly message for the class (they aren't just for live chats!). For example, an instructor might only record 30 s or so in a video that may sound something like this:

This week we will be considering ways to change behaviors using various conceptual models. I noticed in your posts last week that many of you believe that rewards are the key! Over three-fourths of you stated that, in spite of the "Begin with the Brain" article we read, you feel that a point system of some sort works best. This week, I may try to change your mind!

Those things not easily communicated through the written word (i.e., enthusiasm, emphasis, passion for the content) may be more easily conveyed in this format. This also lets the learners "get to know" instructors and allows for more individualization of courses that may be shared within a department. Even if the content is the same for different sections, students are not getting a complete cookie cutter version.

Preparing the Next Generation of Teachers through Podcasting

Podcasting is a recent development in asynchronous learning opportunities for college students. Based on the use of audio, video, and ongoing accessibility, Podcasting is aligned with the considerable research base for distributed learning opportunities. Research on streaming video is similar to the concept of podcasting (i.e., a technology too new to have a substantial research base). The term *podcasting* derives from the concept of broadcasting to an iPod (Hammersley, 2004). In effect, this is a method of broadcasting (as in radio/TV) multimedia files that could be in a purely audio format (mp3) or audio/video format (mp4) via the Internet such that these broadcasts could be viewed either directly (in a manner similar to streaming video) on personal computers or on personal mobile devices commonly referred to as MP3/MP4 players or iPods. In simple

terms, it is possible for teacher educators to use existing recordings of lectures, video footage of classroom examples, PowerPoint/Keynote presentations, and newly created narration to offer students ongoing access to a virtual "Best of Show" for the critical skills in teacher education programs.

Podcasting increases our opportunity to respect diverse talents and pathways to learning. The process provides opportunities for increased student engagement and ongoing access to valuable resources. Students can use podcasts to learn new content and revisit essential information, as necessary. Non-traditional students, who usually have varied schedules, benefit from flexible access to instruction. Presentation via audio and video provides learning through alternative channels. Instruction that can be delivered with flexibility allows the learner to establish his/her own preferred learning environment. Also, for academically struggling students (e.g., college students with learning disabilities), the flexibility and availability of podcasts presents a rare opportunity for repeated exposure and practice with critical course content.

Case 3: Podcasting Critical Content

Podcasting can be as easy as audio-taping a class lesson and then uploading to any number of free podcast websites (www.podcastblaster.com). Many universities already have equipment and server space available as this practice becomes more commonplace. As an example, related to the ubiquity of iPods on college campus, Apple has developed a distinct directory of podcasts for university content known as iTunes University (see http://www.apple.com/support/itunes_u/) that represents a partnership between the iTunes music store and numerous universities across the country. There is no charge to students for iTunes University content. Students can then go to the website or directory and download the broadcast, either to the computer or to a transportable media player (e.g., iPod). In the classroom, the following types of comments might now be heard:

"If you would like to download and replay today's lecture to review, you can download the podcast at podcastblaster.com/hines/." An example of a common use of podcasting in a university class; students could literally listen to the lecture again while working out at the gym.

"Go to http://faqautism.com/episodes/classroom_circle_time.mp3 and listen to Cathy Knoll talk about circle time for children with autism. How can you use this information when preparing for circle time in a diverse classroom? Post your response on the discussion board under 'Circle Time.'"

"Locate and subscribe to one podcast that centers on a disability of your choice. Listen each week to the podcast for one month. Prepare a two-page summary

of key content and your reflections on the quality of the content itself. Check content quality against other available sources, and include references at the end of your paper (two required). Upload your paper under 'Assignments.'" (Examples of media enhanced or online course use of podcast).

Using Wikis as an Instrument in the Classroom to Empower Students and Foster Collaboration

Collaborative websites called *wikis* (see http://en.wikipedia.org/wiki/Main_Page for the most commonly used example) are a set of expandable web pages that can be edited by anyone within a learning community (Engstrom & Jewett, 2005). Wikis provide a very effective and user-friendly opportunity for collaboration. Today's students are extremely familiar and comfortable with social networking tools and applications. Students, teachers, and teacher educators can use them to work together to share and build on knowledge. Webopedia (n.d.) defines *wiki* as follows:

A collaborative Web site comprises the perpetual collective work of many authors. Similar to a blog in structure and logic, a wiki allows anyone to edit, delete or modify content that has been placed on the Web site using a browser interface, including the work of previous authors. In contrast, a blog, typically authored by an individual, does not allow visitors to change the original posted material, only add comments to the original content.

An important feature of a wiki is its ability to keep track of the history of a document as it is revised. When a user edits information, that revision of the content becomes the current version, and an older version is stored. This feature provides a clear view of the evolution of a project. Another important feature is that you can make your wiki public or private.

Students having the opportunity to participate in wikis are engaged in inquiry-based learning and work together to compile information and problem solve, depending on the assignment. A wiki makes it easy for students to write, revise, and submit an assignment since all three activities can take place in the wiki. The instructor has the ability to participate or use a student-led model, but, at a minimum, the instructor is encouraged to monitor the material posted.

Wikis can be a powerful tool for educators. Creating a wiki using <http://pbworks.com/education> is user-friendly, free to use, and, if used for educational purposes, free of advertising. Wikispaces.com is another site that provides free wikis to teachers (<http://www.wikispaces.com/site/for/teachers>) that are easy to use. The site also is provided at no cost, is free of advertising for K-12 education, and just takes a few moments to register. Public wikis are free to everyone

at this site, but advertising is included. Step-by-step instructions and tutorials guide you through setting up your wiki on both sites.

Case 4: Wikis in Teacher Education

A sample application for students may be to research a topic and provide different perspectives. Organize the students into small research groups and assign a specific topic or perspective, for example: "*Operant Conditioning*. Create the wiki providing a title, and compose the first post asking the students to investigate and explore Operant Conditioning. Send an e-mail to the students inviting them to participate in the wiki."

To complete the assignment, students will:

1. Join the wiki.
2. Investigate and explore the event assigned.
3. Analyze information found, and post one fact or aspect of Operant Conditioning. Posts can include photographs as well as audio and/or video files. A link to an expert on the topic could be provided.
4. In addition, contribute to at least two posts of your classmates.
5. Students can be evaluated on quality, timeliness of content, and activity in contributing and editing work of others.

Wikis are an excellent tool to promote collaboration. Students can add information, make suggestions, and create a comprehensive depository of information.

Using Blogs to Prepare New Teachers

Blogs, short for web logs, are web pages that contain dated text (or other media) entries about a particular topic and can be accessed from anywhere students have web access. Blogs are an excellent tool for one-to-many communication. Unlike wikis, someone can comment on another person's blog but not change it. The blog entries appear in reverse order so the most recent appear first. Other information, such as links to other websites and images, also may be included, but blogs generally provide opportunities for users to share commentary on a specific issue or topic and often take the form of journaling. Blogs lend themselves to exploratory topics or enhancing writing skills since they provide students with an audience (Kennedy, 2003). Others suggest that blogs are best used as student portfolios that keep record of an individual's progress and accomplishments, as well as reflections (Weller, Pegler, & Mason, 2005). The blog also can be used as a repository of professional resources and information related to online collaborative learning (Roberts, 2006). Another way to use a blog could be to

showcase student work, which has shown to have a number of pedagogical benefits, such as being motivational for students, promoting student reflection, improving attitudes towards subject matter, and increasing student achievement (Dixon & Black, 1996; Riley & Roberts, 2000; Routman, 1991; Schofield & Davidson, 2002; Snyder, Lippincott, & Bower, 1998). However blogs are used, they offer the opportunity to access controlled information readily.

The first blogs were manual entries in the late 1990s, but their surge in popularity occurred in 1999 when blog development applications were released. Template-based software made it easy to create a blog on a Web server and add entries without having to know any HTML. Blog hosting services came along and offered the same functionality on their own servers, allowing anyone to maintain a blog on the Web. Webopedia (n.d.) states the word blog itself is also used as a verb, so for students to “blog” usually refers to going online and writing about a topic for others to view. Creating a blog using *Blogger* (www.blogger.com) or *Edublogs* (<http://edublogs.org/>) is completely free of charge.

Case 5: Applications of Blogs to Teacher Education and Special Education

Using a site such as *Edublogs*, educators can create websites to host blogs and other web pages. According to the site, *Edublogs* can be used to share lesson plans, incorporate multimedia, create a fully functioning website, host online discussions, and more. A sample application could be to create a blog about a current events issue in education, for example: “Is *NCLB* helping or hurting students receiving exceptional education services?” To complete the assignment, students will

1. Create an *Edublogs* account at <http://edublogs.org/>
2. Research the *NCLB* and the effect on students with exceptionalities.

3. Write a blog about the issue. Based on the information researched, state what you believe and back it up with the research.
4. Include a multimedia clip to illustrate what you’ve found.
5. Include a discussion question for people to respond to.
6. E-mail your blog address to the class.
7. Comment on at least one other student’s blog.

For this assignment, each student has the opportunity to research a topic of importance, critically reflect and post their findings, and critically reflect and comment on the findings of others.

Discussion

The development of engaging and effective lessons for today’s students involves appealing to their technological strengths. Focusing on multi-media components and virtual interactivity will provide the learner an opportunity to connect to the material in a way that is more familiar and natural than traditional means. The ability of teacher educators to be proficient with technology and develop a wide range of skills in order to reach today’s learners is essential.

The use of many of the tools and programs discussed also create a flexible learning environment. Providing the learner the opportunity to decide when and where they learn, as well as the pace at which they learn, also appeals the learner’s strengths. We can use the tools with which students are most familiar and comfortable to deliver content and assess their understanding.

Today’s teacher educators are teaching a new type of learner. While adapting to the learning needs of “digital natives,” faculty also face the daunting task of keeping up with skill sets needed to teach with increasingly diverse delivery options. Maximizing the use of available media and offering students the opportunity to express information in a variety of ways may be key in keeping classrooms contemporary and effective.

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