Online In Real Time: Using Web 2.0

for Distance Education in Rural Special Education

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ACRES American Council on Rural Special Education

Special Monograph

ONLINE IN REAL TIME: USING WEB 2.0 FOR DISTANCE EDUCATION IN RURAL SPECIAL EDUCATION

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DEDICATION

This monograph is dedicated to the pioneers of distance education and those who have taken risks by applying new instructional technologies to prepare personnel in the field of special education

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ACKNOWLEDGMENTS

The Editors of this monograph appreciate the time dedicated to preparing these chapters and the patience of the authors during its preparation.

Chapter 1

ONLINE IN REAL TIME DELIVERY OF PROGRAMS AND SERVICES: WEB 2.0 AND BEYOND IN SPECIAL EDUCATION

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In the 21st century, people increasingly live in a world where everything they do – communicate, socialize, work, play, learn, shop – is done online. From the minute they wake up to the minute they fall asleep, they use multiple digital devices, moving seamlessly from smart phone to watch to computer to display monitor to printer and back to acquire, manipulate and produce information and share it with others across the Internet's global community. They stay in touch with family and friends; purchase clothing and order food items to stock pantries; pay bills and make travel plans; manage health care and finances; access entertainment, such as books and television shows; socialize with others with like interests; learn new content through webinars, blogs, and wikis; and on and on and on. People now can publish their own photos, video recordings, and books; market their own products and services; and even host their own radio and television shows, reaching out to anyone with online access at any time, in any place. The ability to use these technologies well influences every aspect of their personal and professional lives.

Prensky (2010) argued that the Internet occasioned a major cultural shift, characterizing those born before as "digital immigrants" and those born after as digital natives." Those who have grown up in a world surrounded by an array of easy to use digital devices and instant and ubiquitous online access are digital natives, fully at home in the online environment. Digital natives cannot imagine a world without mobile computing, instant messaging, social media sites, and viral videos and eagerly anticipate the next breakthrough in technology. Even preschoolers can use a smart phone or tablet to videoconference with a traveling parent or play games using apps for young children. Older children, adolescents and young adults are rarely without a mobile device and easily produce and disseminate multimedia content to their peers and families. Those born earlier have learned to accommodate to this new environment, although as digital immigrants, they are sometimes challenged to learn all the customs of our new homeland but would be lost without today's technologies. Most adults consider cell phones as lifelines, use GPS devices to find their way around, and rely on search engines as dictionaries, encyclopedias, and health resources. Even senior citizens enjoy video conferencing with their distant grandchildren, playing online Bingo, and joining web blogs with buddies from an earlier time in high school, college, or military service. Is it any wonder that we now expect educators to offer online learning activities and educational programs for PK20 students as well?

This opening chapter serves as an introduction to current trends and future developments in digital technologies that impact the delivery of online programs in special education at the post-secondary level, and to a lesser extent, at the elementary and secondary level as well. It starts with a discussion of Web 2.0 technologies, then presents an overview of the literature on online programs in special education that have been developed in institutions of higher education, as well as in public schools and community agencies, and concludes with a review of emerging issues and trends. The remaining chapters in the book present how special educators have made use of new and emerging technologies to deliver online in real time programs in personnel preparation and service delivery.

OVERVIEW OF WEB 2.0 AND ITS IMPACT ON EDUCATION

Society's relationship with online technologies is an ever-evolving phenomenon. Argawal (2009) presented a model to explain the Internet-human interface: Web 1.0 was about transmission of information (the content web), Web 2.0 is about interaction with others (the social web), and Web 3.0 will be about individual customization (the personal web). The current phase, Web 2.0, or the "Social Web," is characterized by interactivity, sharing and collaboration (Hay, 2009). Social media, such as blogs, wikis, Facebook, YouTube, Twitter, and Instagram, allow people to readily create and disseminate their own content, with new applications emerging every year. These new social tools combined with ever-smaller mobile devices and ubiquitous Internet access enable individuals to form groups to communicate and take collective action without the need for formal structures (Shirky, 2008). Other developments in technology led to the creation of inexpensive, user-friendly multi-point desktop conferencing programs that facilitated communication and collaboration at a distance for teams in corporations and classes in institutions of higher education (Angelo, 2006).

Desktop conferencing applications permit online interactions in real time for communicating with voice plus image, as well as viewing content at remote locations (Finkelstein, 2006).

Hofmann (2004) suggested that instructors must address two factors to use these synchronous or real time technologies effectively: (a) understanding the tool well enough to know what can and cannot be done with it and (b) achieving an appropriate balance between presentation of content and interaction with learners. Garrison, Anderson, and Archer (2001) proposed the construct of "social presence" to explain how instructors and learners develop interpersonal relationships at a distance. Anderson (2003) stated that interactivity must be central to effective online learning and described six forms of interaction: (a) student-teacher, (b) student-student, (c) student-content, (d) teacher-content, (e) teacher-teacher, and (f) content-content. Live online conferences help each participant to convey an "electronic personality" (Palloff & Pratt, 2007), building more meaningful interpersonal relationships that promote networking and development of genuine communities of practice.

Online Programs in Higher Education

Higher education continues to make extensive use of online technologies for programs on campus and at a distance. Brookes (2009) suggested the growing integration of Web 2.0 technologies into society as a whole has driven this move to online courses and programs. A national survey of colleges and universities sponsored by the Sloan Consortium showed that, by 2010, online enrollments were growing 10x faster than campus enrollments and most institutions recognized increasing competition from online programs, especially those in the for-profit sector (Allen & Seaman, 2010). At the same time, a federally funded review and meta-analysis of studies comparing online and face-to-face instruction found that students performed slightly better in online courses across formats, learners, and content (U.S. Department of Education 2010). The Campus Computing Project's survey (Green, 2010) found that 96% of colleges and universities expected online enrollments to increase significantly over the next 3 years. Teachout (2009) warned that online programs would make campus-based programs obsolete and threaten the existence of many brick-and-mortar colleges and universities, as well as the entire academic tradition of research and tenure with it, but Walsh (2011) argued that online courses and programs would become the key to improving access to higher education opportunities in the United States.

This trend toward growing use of online technologies, both real time and on demand, for instruction has continued to advance. Just this year, a report on distance education based on federal reporting data (Poulin & Stuart, 2016) found that 14% of all higher education students took all courses at a distance, while another 32% indicated they took at least some courses at a distance. The authors reported that overall enrollment in colleges and universities fell by 2%, but distance education enrollments grew by 9%; however, the vast majority of students (85%) who complete their education entirely at a distance enrolled in an institution in their home state. Public non-profit institutions were more likely to seek in-state enrollments, while private for-profit provides sought enrollments across states. Blumenstyk (2016) reported on the growing trend for colleges and universities to use online in real time instruction for distance education courses. In the most recent of a series of reports on the state of online education in the U.S., the Babson Survey Research Group (Allen, Seaman, &Poulin, & Stuart, 2016) indicated that over 77% of chief academic leaders indicated that online learning is critical to their long-term institutional strategy. It is clear that institutions of higher education see online programs, including those offered by online in real time technologies, as critical to their mission for the foreseeable future.

Online Programs in Elementary and Secondary Education

Educators have been somewhat slower to capitalize on the options for teaching and learning new technologies provide for education in elementary and secondary schools. A review of state policies (Watson & Ryan, 2007) found that nearly all states had begun making some use of online technologies for supplemental courses or as virtual K-12 schools. A national survey (Project Tomorrow, 2010) found that the number of high school students in online courses doubled between 2008 and 2010; 27% of high school students and 20% of middle school students reporting taking an online course. The MetLife Survey of The American Teacher (Markow & Cooper, 2008), however, found that the nation's teachers had much less online experience: Only 40% had taken an online course, and only 15% had participated in any online professional community. The Project Tomorrow (2010) survey found that, while the number of teachers who had taught an online course had tripled in the 2-year period, only 4% of teachers reported that they learned to teach online in their preservice program. Prensky (2010) argued that today's digital native learners expect to learn with technologies so digital immigrant educators must make more effective use of technology to support their learning.

According to recent data from a national survey (Evergreen Education Group, 2015), the use of online courses and programs has transitioned from statewide virtual schools to offerings by individual districts and schools. The survey found that 24 states have virtual schools, attended by about 275,00 students (25% at the secondary level) in full time attendance, often as a replacement for or supplement to home schooling or home-bound instruction. The authors estimated that over 2 million K-12 students have taken at least one online course (at school or from home), with nearly 75% of courses in core academic areas. The data revealed that the majority of students enrolled in online courses to access content not available in their local school, such as advanced placement courses or specialized academic areas. There is no doubt that schools will continue to expand their use of online instruction in the years to come.

Rural schools often struggle to provide challenging curriculum options for high achieving students due to their smaller enrollments and less experienced teachers (Cross & Burney, 2005).

A national survey of rural high schools found that technology was not a major barrier; nearly all schools used distance education (most often for advanced placement courses), and school leaders indicated that they would like to make greater use of online technologies (Hannum, Irvin, Banks, & Farmer, 2009). This study suggested that online programs can serve rural schools by training on-site facilitators who support rural students in learning online content and connect this content to the context of the local community.

WEB 2.0 AND ONLINE PROGRAMS IN SPECIAL EDUCATION

As a discipline, special education may have been quicker to adopt new technologies for teaching and learning than any other group within education or outside of it. At colleges and universities, teacher educators have developed hybrid courses, online courses, and even totally online programs using an array of technologies from online learning management systems, virtual classrooms, desktop conferencing, electronic portfolios, and assessment management systems. In school systems and human services agencies, teachers and administrators have developed online communication with parents, online lessons for homebound students, and even fully online virtual schools. Because of the unique challenges of preparing professional personnel for and in rural communities and delivering quality special education and related services in rural schools, rural special educators have been leaders in designing and implementing distance education programs for more than two decades. As each new technology emerged, rural special educators (teacher educators and school agency personnel) were quick to adopt and adapt them to preparing personnel and serving students with special needs.

Online Programs to Prepare Special Education Personnel

Since the mid-1980s, teacher educators at colleges and universities across the country have used a variety of technologies to deliver distance education programs to prepare prospective and practicing teachers and address the critical shortages of qualified personnel in rural communities. In the earliest distance education programs, special educators offered programs by means of television technologies, primarily by means of microwave or satellite communications (Ludlow & Brannan, 1999). When the Internet became more widely available in the late 1990s, special educators began to develop online courses and programs, although early users were limited to using asynchronous (on demand) applications, such as email, threaded discussions, and blogs (Blackhurst, Hales, & Lahm, 1998; Meyen, Lian, & Tangen, 1997). Within the next decade, many universities began to offer online programs to expand access to professional preparation programs in rural areas (Ludlow, Collins, & Menlove, 2006).

The earliest application of real time online formats for personnel preparation in special education began around 2000 with the advent of new synchronous technologies. The first reported use involved CU-See Me, a basic desktop conferencing program, accessible to only a very small number of sites (Spooner, Agran, & Kiefer-O'Donnell, 2001). Webcasting software also was used to stream live video and audio to an unlimited number of sites with real time interactions via phone conferencing (Ludlow & Duff, 2002). When virtual classroom programs, such as Wimba Classroom, Elluminate, and Adobe Connect, became more widely available around 2004, teacher educators in special education began using them for real time interactions. These programs, which combine desktop conferencing with presentation and application sharing tools, have been used for course instruction (Steinweg, Davis, & Thomson, 2005), clinical supervision (Pemberton, Cereijo, Tyler-Wood, & Radamacher, 2004), peer coaching (Knapczyk, Khe, Frey, & Wall-Marencik, 2005), and professional development for groups (Forbush & Morgan, 2004) as well as individuals (Stowitschek & Guest, 2006). Desktop conferencing also has been used for progress review conferences of students, cooperating teachers, and university faculty (Jung, et al., 2006), remote observation of teaching performance (Dymond, Renzaglia, Halle, Chadsey, & Bentz, 2008), and communication of immediate feedback during classroom instruction using bug-in-the ear technology (Rock, et al., 2009). Virtual immersive environments were adapted for instruction in real time using TeachME, a specially designed simulation (Dieker, Hynes, Hughes, & Smith, 2008); Second Life, a publicly available online world (Hartley, Ludlow, & Duff, 2011); and OpenSim, an open source tool for creating virtual environments (Glomb et al., 2012). Each year, in professional journals and at professional conferences in the field of special education, higher education faculty describe a wide range of applications of online in real time technologies in teacher education courses and programs.

Online in Real Time Technologies for Special Education and Community Services

Real time online technologies obviously presented immense potential to enhance programs and services offered by public schools and community agencies for individuals with exceptionalities, especially in rural areas. Technologies could be used to facilitate home-bound school for students, home-based intervention programs for families, and remote therapy for children and adults. Rice (2006) asserted that online instruction offered many opportunities to employ universal design for learning principles that would benefit individuals with a broad range of individual needs; however, Roblyer and Davis (2008) argued that virtual schools failed to identify and implement research practices for supporting at-risk learners, including those with disabilities or other special needs. A special issue of *Teaching Exceptional*

Children published in Summer 2014 addressed the practices, issues, and trends in special education in virtual K-12 schools (see Table of Contents at http://tcx.sagepub.com/content/46/5.toc); yet, to date, there have been relatively few reports in the professional literature on online in real time technologies for school- and community-based programs for individuals with disabilities and their families.

Virtual public school programs. State education agencies and individual school systems have begun to deliver special education and related services to students with disabilities who cannot attend school due to special needs or who attend schools in remote communities. An early national survey by the National Association of State Directors of Special Education (NASDSE; Muller, 2009) found that students with individualized education programs (IEPs) represented only a small proportion of the population of students served in virtual public schools. NASDSE then conducted a policy forum (Muller, 2010) in which national leaders identified critical issues and offered recommendations for schools for implementing online programs for students with disabilities. A recent report (Burdette, Greer, & Woods, 2013), however, found a growing number of individuals with disabilities are participating in online courses and programs. A more recent report by the National Education Policy Center (Miron & Gulosino, 2015) found that, although the overall number of students with disabilities served in online courses has increased over time, they are represented as only 7.2% of student population in virtual schools, compared with 13.1% of the student population in brick-and-mortar schools.

This review identified only a few reports of real time technologies used for virtual school in the literature. Online in real time technologies have been used to support gifted and talented students in rural areas, especially in rural communities, so they can take a wider range of course offerings at the high school level as well as access advanced placement courses at colleges and universities to facilitate the transition to post-secondary education programs (Cross & Burney, 2005). They also have been used for remote tutoring of students with hearing impairments where face-to-face contact facilitates use of sign language (Baker, 2010).

Virtual schooling presents opportunities and challenges for students with disabilities (Ash, 2010), offering more opportunities for personalized learning and providing a more controlled environment for learning at home, but also demanding more skill in designing instructional activities and increasing the responsibilities of the parent for the educational program. Virtual schools must comply with all federal education policies, including those laws that govern services for students with disabilities, including accommodations, curriculum modifications, and assistive devices (Rhim & Kowal, 2008). The International Association for K-12 Online Learning (iNACOL) has established standards for ensuring equitable access to online learning for all learners (Rose, 2014).

Virtual schools also face unique challenges in meeting accountability standards when serving diverse learners, especially at risk students and those with disabilities and other special needs (Locke. Ableidinger, Hassel, & Barrett, 2014). Rose and Blomeyer (2007) argued that students with disabilities could be successful online learners and recommended that virtual schools employ specially trained personnel to design and deliver online courses. Some early outcome data from virtual schools (Repetto Cavanaugh, Wayer, & Liu, 2010) suggested that online education can be helpful in preventing dropouts by supporting graduation by students with disabilities. More recently, Vasquez and Serianni (2012) reported finding only a handful of studies that examined the outcomes of online education for K-12 students with disabilities. They asserted that, given the number of students being served in virtual schools, research is urgently needed to establish best practices for working with those who have special needs.

Virtual community services programs. Once new technologies that facilitated online interactions in real time, especially two-way videoconferencing, became more widely available, professionals in related services disciplines began to adopt them to provide community-based programs and services to children and adults with disabilities, especially those residing in rural areas. These services have been variously termed tele-practice (American Speech and Hearing Association [ASHA]: see http://www.asha.org/Practice-Portal/Professional-Issues/Telepractice/); tele-intervention (National Center for Hearing Assessment and Management [NCHAM]: see http://www.infanthearing.org/ti-guide/); and tele-rehabilitation (American Occupational Therapy Association [AOTA]: see http://telerehab.pitt.edu/ojs/index.php/Telerehab/article/viewFile/701/950.

Online in real time technologies opened new avenues for delivering community services to children or adults with disabilities and their families. Video-conferencing has been used by early intervention services to conduct virtual home visits to provide supports and services for young children with developmental delays and disabilities and their families (Kelso, Feichtel, Olsen, & Rule, 2009), to conduct parent training activities for families of children with autism (Baharav & Reiser, 2010), and to make early intervention programs accessible to families residing in rural areas (Cason, 2009 It also has been used to deliver consultative occupational therapy services for young children in early intervention programs (Hiemerl & Rasch, 2009) and for students with various disabilities in elementary schools (Criss, 2013)

Web 3.0 and Beyond: Emerging Technologies and the Future

Web 3.0 is often referred to as the "Semantic Web" (Berners-Lee, Handler, & Lassila, 2001) because it focuses on underlying meaning rather than observable content with computer-facilitated linking of multiple sources of information to answer complex questions. As Web 3.0 evolved and the more people have enjoyed and become dependent on new technologies, the more they wanted them to be available at all times and to interact in ways that enhance human abilities and endeavors. Three intersecting technology trends that are beginning to impact education are (a) mobility and portability of devices and connectivity, (b) globalization and personalization of learning, and (c) virtual reality applications for learning activities.

Mobility and Portability

Ray Kurzweil (2001), inventor of the flat-bed scanner, the music synthesizer, the text-to-speech reader, and speech recognition software, foresaw that the evolution of technology is exponential and would continue to produce ever smaller, yet faster and more powerful, devices and applications. Subsequently, advances in computer chip technology rapidly shrank computers from desktops to laptops to tablets and cell phones to smart phones to wearable devices, making online access ever more mobile and portable. The American Recovery and Reinvestment Act of 2009 included over $7,000,000 to expand broadband access, stimulate demand for faster connections, and promote online learning opportunities, especially in rural areas (Federal Communication Commission, 2009). This resulted in higher levels of high-speed access using wired and wireless Internet connectivity in many communities, including those in rural areas, paving the way for broader use of online in real time technologies. Berry and colleagues (2011) have suggested that digital natives are represented by two different cohorts: (a) the Net generation, born into a world with online access, and now (b) the iGeneration, born into an ever-present mobile virtual environment, and these experiences have profoundly changed the way young persons think and learn. These individuals rely on mobile devices and their applications (or "apps"), ubiquitous Internet access, and cloud computing resources. In a survey about the future of the Internet in 2020 (Anderson & Rainie, 2010), technology leaders predicted that the rapid growth of continual access to massive amounts of information would require supporting children and adults to develop better skills for information processing, decision making and problem solving.

Globalization and Personalization

New and emerging technologies have changed the nature of society and how people interact with others as individuals, as well as within institutions such as schools, colleges and universities. Friedman (2007) described how technologies were creating a "flat" world where every individual has the power to connect, collaborate, and compete with others in a "global collaborative community," unrestricted by dimensions of time, place, culture, or nationality. According to Collins and Halverson (2009), the Industrial Revolution was the impetus for the development of the teacher-directed mass schooling model to develop just-in-case learning that characterized education in the 20th century, but the Information Revolution already has created a demand for a student-directed individualized learning model that promotes just-in-time learning through technology-based experiences within and outside schools that will soon represent education for the 21st century. Harvard's Christensen (Christensen, Baumann, Ruggles, & Sadtler, 2006) described these new technologies as "disruptive innovations" that will make products and services accessible to and less expensive for a wider group of consumers worldwide and result in major social changes. With his co-authors (Christensen, Horn, & Johnson, 2008), he examined how educators had begun to use technology to create customized, student-centric learning experiences that will help American students at all levels be competitive in the global economy. Walsh (2011) argued that the development of open online courseware at elite universities like Yale, MIT, and the University of California at Berkeley developed initiatives that would lead to the unbundling of programs as students assemble their own collection of courses to create personalized degrees or certification programs using expert-designed curriculum segments from institutions across the globe.

Virtual Reality Applications

Today's sophisticated technologies are facilitating the creation of computer-generated three-dimensional (3D) environments (virtual worlds) and dynamic images (holograms) that represent close approximations to objects and events in the real world are already creating new opportunities for online in real time education. Harvard's Dede (2009) asserted that virtual learning environments would begin to make possible important new opportunities for creating situated and active learning activities for student of all ages. Hugo de Gara (2010) argued that the rapid evolution of new technologies would soon make possible holographic 3D representations that will appear as lifelike as real objects or bodies and engender the same physical and emotional reactions. Educators already have begun to use online 3D virtual environments like Second Life® to design simulated learning activities as well as online classrooms or real time interactions in online courses (Ludlow, 2015). They are just beginning to experiment with the use of holographic images to create 3D models of learning objects (Dugdale, 2013) and projected 3D images of presenters (Taylor, 2015). Schmidt and Cohen (2013) have suggested that, within the next decade, people of all ages will move easily between the real world and the virtual world for many different aspects of life. Consequently, technology leaders like Mark Zuckerberg have invested heavily in these new virtual reality technologies (Young, 2014), which are believed to be the next "disruptive innovation" in education.

FINAL THOUGHTS

This book was designed to provide an update on current applications of online in real time technologies as they impact special education and community services, especially in rural communities. This book presents a variety of chapters that illustrate how personnel preparation and professional development programs currently are being offered online using real-time technologies to prepare special education teachers and leadership personnel at a distance.

The authors featured in the chapters of this book are innovators in the field of special education from institutions of higher education. They have tested new technologies to deliver coursework based on the need to reach rural students (Chapter 2 - Ault, Spriggs, & Collins; Chapter 3 – Pearl & Vasquez; Chapter 4 – Keramidas & Ludlow; Chapter 5 – Rao, Edelen-Smith, & Skouge), including the preparation of doctoral students (Chapter 6 – Martin & Miller; Chapter 10 – Hudson, Owiny, & Stenhoff). They have embraced technology to supervise and mentor special education teachers at a distance (Chapter 7 – Koch, Porter, & Cipello; Chapter 8 – Israel, Smith, & Billingsley; Chapter 9 – Glomb, Mason, & Blair) and to provide rural services (Chapter 11 – Fiechtel, Olsen, & Rule). Finally, they have embraced and designed applications of cutting edge technologies (Chapter 12 – Dieker, Lignugaris-Kraft, Hynes, & Huges; Chapter 13 – Hartley, Jones, & Ludlow).

Many technologies people once thought of as science fiction fantasies already have come to pass. Who knows where the applications emerging now, still to be developed, and yet to be imagined will lead in the years to come? Will they immerse themselves in 3D virtual learning environments so realistic they forget they are in cyberspace (See image at http://thenextweb.com/dd/2014/06/24/linden-labs-building-new-second-life-scratch-woo-new-users/#gref)? Will they interact with each other at a distance via life-size holograms, such as Cisco's Holographic TelePresence system (See image at ihttp://whatis.techtarget.com/definition/holographic-telepresence)? Will they practice and refine skills on avatars with artificial intelligence before applying them in the real world (See image at https://www.chatbots.org/avatar/)?

There is no doubt that online in real time technologies have influenced and will continue to impact personnel preparation and service delivery in special education in rural areas. Special educators can look back with satisfaction on a long history of adapting technologies for use in training prospective and practicing teachers and therapists as well as for delivering programs and services in pubic schools and community services. As the pace of technological change unfolds at ever increasing speeds, new applications will continue to offer new opportunities for personnel preparation and service delivery in special education in rural areas. As each new tool becomes available, one thing is certain: Rural special educators will be quick to test its capabilities and expand its uses to benefit the field. Driven by the ever-present goal to enhance and expand opportunities for individuals with exceptionalities in rural communities, there is no doubt this profession will continue to explore emerging technologies in the years to come.

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Chapter 2

DESKTOP CONFERENCING SUPPORTS FOR A DISTANCE EDUCATION PROGRAM: THE USE OF CONFERENCEME™ AT THE UNIVERSITY OF KENTUCKY

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PROGRAM DESCRIPTION

The graduate program in Moderate and Severe Disabilities (MSD) in the Department of Early Childhood, Special Education, and Rehabilitation Counseling at the University of Kentucky (UK) has been offered in a distance education format since 1989 (Collins, Baird, & Hager, 2009). The program began as a site-based face-to-face program in Severe/Profound Handicaps (SPH) and Early Childhood Special Education (ECSE) offered by a single faculty member in a small rural town 77 miles from UK's main campus and resulted in a Master's degree, initial certification, and advancement in teacher rank. Over time, both the program content and the technology by which it was delivered changed, and each change was supported by grant funding for personnel preparation through the U. S. Department of Education Office of Special Education Programs.

Consistent with changes in categorization by the Kentucky Department of Education, the content was expanded to include a focus on MSD as the ESCE program broke off to offer separate classes and certification. Over time, the program also expanded to offer a graduate level alternative certificate program to enable students without licensure who were enrolled in the program to teach under temporary provisional certificates while taking classes to complete certification requirements.

As new technologies became available at UK, the off-campus program was moved to UK's main campus, and instructors began using technology to transmit coursework to distant sites. The program was delivered first with satellite technology (one-way video) supplemented with conference calls (two-way audio) and then with interactive video (two-way video and audio) that used the state's telelinking network. At present, the MSD program is continuing to explore the use of new technologies. Since the program has a heavy field component, the use of a desktop video conferencing system supplemented by a Bluetooth audio component and software to allow the observer to control the camera from a distance is being used to supervise the most geographically remote students (i.e., those teaching in districts over 100 miles from UK's campus). In addition, content is being delivered to distant students via the desktop conferencing system, ConferenceMe™. This chapter will focus on the program's use of ConferenceMe™.

CONTEXT

As special education faculty in the department have become more accepting of offering coursework via distance education technology, the on-campus and off-campus MSD programs have slowly merged, allowing a single instructor (or co-instructors) to teach both on-campus and off-campus students simultaneously rather than have separate sections with different instructors for each group. When interactive video technology became available to faculty, it quickly was adopted for all courses in the program since its synchronous capacity allowed live interaction between the instructor(s) and all students. The technology was readily adaptable to lectures, demonstrations, interviews, small group activities, sharing of video, and presentations from all sites.

While interactive video met the needs of the distance education program in MSD, there were challenges that arose. When the community college system had been part of UK, the university owned the rooms and equipment used for classes at each distant site. However, in 1998, the community college system broke away from UK and became an independent college system (Kentucky Community and Technical College System). Due to this change, UK had to begin renting the distance education rooms at each site. In addition, technicians and monitors who assisted with class functions (e.g., monitoring transmission, monitoring tests, faxing materials) and previously had been hired by UK were now hired by each site, creating a situation where UK program instructors had little recourse if these individuals failed to perform their jobs with the needed degree of competence. Also, school calendars and closures in the system sometimes failed to align with UK's schedule, creating a situation where students sometimes did not have access to the distant classrooms on nights scheduled by the MSD program. In response, UK's Distance Learning Programs began to search for alternate sites within the telelinking network where courses could be scheduled (e.g., classrooms at other institutions of higher education, public libraries, regional educational cooperatives, high schools, state-supported specialized schools). Sometimes, the sites selected were inconvenient for students (e.g., located over an hour's drive from the students).

Instructors in the MSD program continued to prefer the interactive capabilities of the interactive video system, as well as the ease with which they could conduct classes without having to worry about operating equipment in addition to teaching content. It was becoming clear, however, that an alternative method of delivery was needed. Instructors were beginning to use UK's Blackboard learning management system more extensively for supplementing their classes but did not want to move to an asynchronous format for delivery even if this could be supplemented by real-time chats. Experience with asynchronous course delivery had shown them that the continual need to update text- and video-based materials was time intensive, and they wanted more quality real-time interactions for modeling, discussing, and providing immediate feedback than could be offered through live chats. When UK began offering Adobe Connect as an option for course delivery, the MSD instructors investigated its use but decided that they wanted to retain the ability to teach a classroom of on-campus students face-to-face at the same time that distant students participated instead of having all students be online learners. Finally, technicians associated with UK's Distance Learning Programs suggested the use of ConferenceMe™ (http://www.tandberg.com/search/ index.jsp?search=ConferenceMe) to meet the MSD program's needs. Instructors in the MSD program initially tested this format in the spring of 2010 with distant students at 2 or 3 locations while continuing to connect the remaining distant students to class from interactive video sites. The trial run was so successful that the program began using ConferenceMe™ with more distant students in the fall of 2010, especially to connect those students living more than 45 minutes from interactive video technology sites. Since this time, updates in the ConferenceMe™ software have resulted in improvements in its functioning so that beginning in fall 2014, the program was used to connect most distant students. Interactive video sites are now used only on rare occasions such as when a student's home internet connectivity is poor, multiple students work or live near the same site, or a student's commute from work to home is too long to join class on time.

TECHNOLOGY FORMATS

ConferenceMe™ is a software system that uses a computer-based application that allows for a user to connect to UK's Codian video conferencing bridge via the Internet. Although the system allows multiple users, UK's distance education technicians have limited this to no more than

12 "seats" per bridge to retain quality. To participate in courses, distant students must have a PC equipped with speakers, headphones, and a webcam. Students can connect with a Mac if the computer is equipped with the proper operating system (e.g., Virtual Box) and is running Windows. The browser plug-in is available for download directly from UK's website. Distant students download and install the necessary ConferenceMe™ plug-in through Internet Explorer prior to the beginning of coursework. To avoid firewall issues, students download and use Cisco VPN Client software that is free to all UK faculty, staff, and students. Clear directions for software downloads are provided through UK's website. In addition, students test the software with distance learning staff prior to attending their first class. At the beginning of each class, distant students connect to the external IP address for the bridge. They log in using their UK identification number to participate in the class. Once entered into the virtual environment from their desktop computers, students receive a live video stream of the class and can participate with two-way visual and audio capacities in real time.

APPLICATIONS FOR TEACHING AND LEARNING

The instructor is in a classroom dedicated to interactive video classes (9 classrooms on UK's campus with 4 additional classrooms located at UK's medical center). A group of on-campus students sit at desks facing the instructor. The use of voice-activated microphones ensures that distant students hear the comments of on-campus students and the instructor. Large monitors in the classroom allow on-campus students to view the materials used by the instructor as well as to see the distant students as they participate in the class.

The instructor also can view two monitors, one that shows the class materials and one that shows the distant students. The instructor can control what on-campus students view on the classroom monitor as well as what distant students view on their computers. This can rotate between computer presentations, hard copies of documents, the instructor speaking and modeling, or the on-campus students participating in class discussions and activities. When content is being presented in class, the instructor appears in a smaller window on the monitor, allowing distant students to see both the instructor and the content, as would be available to on-campus students. In essence, the class operates just as an on-campus face-to-face class would operate. However, a technician is always available at the on-campus site to adjust camera angles and audio volume as well as to problem solve when technical issues arise for the distant students (e.g., breakdown in audio- or video-streaming). The technician also has the ability to change the streaming between a video feed or a computer feed, a solution sometimes used when the quality of the computer presentation is not acceptable.

An advantage to this system is that the technician archives every class using Echo360, a technology that simultaneously records audio and content presented during class, creating the opportunity for all students to view the class online at a later date due to absences, technology failures, or because they just want to review the material. Students can access the archived recordings through UK's learning management system. Another advantage is the flexibility for all students. Any student can access the class synchronously from anywhere. Distant students can choose to remain in their classrooms after school (classes are taught on weekdays at 4:30 p.m.) or they can access classes from home. Students who are traveling can log into classes from any location that has a robust Internet connection. If any student misses participation in the synchronous class, the recorded version is available. Also, scheduling classes has become easier. Since UK has a number of distance learning classrooms (two in the College of Education), multiple classes can be taught at the same time, and it is no longer necessary to locate, coordinate, and schedule specific distant sites.

As with any technology, however, there are limitations. While distant students used to come together at sites and develop collegial networks, they are now isolated at their respective locations. The technology sometimes presents barriers, depending on the locations of the distant students, such as lower audio or video quality in certain parts of the state. Although the instructor can wear a wireless microphone that activates the cameras to follow the sound, quality is best when the instructor remains in one station; remaining in that station also allows the instructor to be more attentive to operating the equipment so distant students do not have the same view of the class for extended periods of time. Another limitation is that the responsibility of accessing coursework has transferred from the technician to the student. While the technician assigned to the course contacts students in advance as to the type of technology (i.e., computer, software download, headphone, microphone) they will need to access the coursework and does a trial run with students prior to the first class, the responsibility for operating the equipment, troubleshooting, and getting through firewalls rests with the distant students. However, technicians are available to assist students over the phone or through e-mail correspondence. The instructor also has more responsibilities, such as ensuring that students have access to materials in advance of class meetings and implementing procedures that minimize dishonesty on exams. To solve these issues, instructors rely on the campus learning management system (e.g., Blackboard, CANVAS) to distribute course materials and for the delivery of exams. Students also are required to sign honesty policies since the exams are not proctored. In addition, students who are isolated at their respective distant sites do not have the opportunity to engage in group activities during class time as was the norm when students clustered together at distant sites in interactive video classrooms or that might be more available with other technologies that allow students to work in groups across sites. Instructors must be diligent about conducting group activities that involve interactions between distant students, and between distant and on-campus students. To do this, instructors can mute the on-campus microphone so that the distant students can work together in a group without being interrupted by the on-campus student groups. To facilitate interactions between on-campus and distant students, students can use video call technologies (e.g., FaceTime, SKYPE), phone calls, and the existing microphones and cameras in the classroom. The more distant students enrolled in a course, the more difficulty instructors will have facilitating interactions between students. Therefore, the MSD faculty requires that students living less than 45 minutes from campus attend the on-campus class.

CONCLUSIONS AND RECOMMENDATIONS

At this time, it appears that the use of ConferenceMe™ is meeting the needs of UK's MSD program to deliver coursework via distance education technology across Kentucky. The transition from using interactive video to using desktop conferencing to reach distant students has been almost seamless. Several recommendations can be made at this time.

Based on a review of the literature, instructors in the MSD program at UK developed guidelines for using interactive video to prepare their doctoral students to be distance educators (Collins, Grisham-Brown, & Schuster, 2010). They have found that most of these continue to apply to ConferenceMe™ since it is a video- and audio-based synchronous delivery system. Their guidelines for implementing and managing instruction include the following:

- preview information that will be presented in class
- cue students to attend
- make eye contact with distant students by looking directly into the camera
- call on distant students by name
- use class examples from students' geographic regions
- repeat major points
- prompt class transitions
- allow opportunities for questions and comments from distant students
- provide a brief wait time after stating a question before calling on a student
- call on students at random
- provide verbal feedback to student responses
- restate, clarify, or synthesize student responses
- repeat student questions before responding

- display a sense of humor
- change tone, volume, or pace to maintain attention and interest
- use appropriate visual materials
- use limited but natural movements and gestures

In addition, there are practical suggestions for improving the quality of instruction when using ConferenceMe™ that include instructor, student, and technician responsibilities. Table 1 outlines these responsibilities.

The strengths of using ConferenceMe™ to deliver instruction is that it allows students to attend university courses regardless of their geographic

Table 1. Practical Suggestions for Improving the Quality of Instruction when using ConferenceMe™

Technician Responsibilities	Instructor Responsibilities	Student Responsibilities On Campus	Student Responsibilities Off Campus
• Prepare and distribute instructions for distant students for accessing the class • Test system with distant students before the first day of class • Arrive to class early to make sure all students are logged on • Troubleshoot technology issues with instructor and students, as needed • Be available before and during class for questions	• Teach distant etiquette (e.g., procedures for participation for distant students, interrupting with questions, microphone use) • Check often for comprehension and call on students by name at both distant and on-campus sites during and after class • Plan camera views and switch often as appropriate for lectures, class discussions, and demonstrations • Carefully plan interactions among students including interactions with off-campus and on-campus students • Limit length of video examples or have students watch longer videos as homework or prior to class • Connect with distant students outside of class time and provide easy access to the instructor (e.g., personal telephone number, virtual	• Ensure that distant students can hear when actively discussing • Keep extraneous noise to a minimum as it is picked up by the microphones • Be respectful of distant students' time for questions • Be attentive to distant students during discussions, questions, and presentations	• Test system with technician before the first day of class • Log on early to make sure you can see and hear • Download materials provided before class • Have robust internet connection and hard-wire to internet • Let instructor and technician know if technology issues arise • Initiate questions and comments, interrupting instructor as needed • Participate in class as if you were physically present (no multi-tasking, playing with children)

	meetings) • Plan interactive supplemental activities outside of class through discussion boards and group assignments • Encourage distant students to connect through exchange of contact information so they can develop relationships	

location and participate in real-time activities with the instructor and other students. Although there are limitations, these can be addressed by carefully planning activities during class time, supplementing the course with activities conducted via the learning management system, and implementing the guidelines and practical recommendations outlined in Table 1.

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LIST OF RESOURCES

Collins, B. C., & Keramidas, C. (2006). Planning and delivering online instruction. In B. Ludlow, B. C. Collins, & R. Menlove (Eds.) *Online Instruction for Distance Education: Preparing Special Educators In and For Rural Areas (*Special Monograph of the American Council on Rural Special Education). Canada: Trafford Publishing.

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Chapter 3

SYNCHRONOUS ONLINE TEACHING: USES OF ADOBE CONNECT AND SIMILAR PLATFORMS

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Since the early 1970's, technology innovations (e.g., the personal computer, laptops, smartphones) have dramatically changed the way knowledge is acquired and utilized. Those innovations also have increased the speed at which new knowledge is generated. According to Arbesman (2012), everything the scientific community understands is replaced by more accurate information at an exponential rate. This creates a flood of new discoveries each year. For example, 845,175 experimental studies were published in 2009, when PubMed launched a new Internet searchable interface. Faculty must possess tools and metacognitive strategies to efficiently acquire and utilize this expanding body of information. Several theoretical frameworks have been developed to address this change in the way we teach and explain how to maximize student learning in a digital age.

THEORETICAL FRAMEWORKS GUIDING TECHNOLOGY IN EDUCATION

Fundamental to understanding the role of technology in 21st Century learning environments is a connection to historic and contemporary learning theories. Siemens (2005) highlighted behaviorist, constructivist, and cognitivist learning theories were developed prior to the development of modern technologies. He argued technology-based tools would alter the way we process information, develop schema, and communicate within formal and informal networks.

In 2005, Siemens introduced connectivism as a learning theory for the digital age. Connectivism is grounded in the notion that information gains (i.e., advances in current knowledge) occur at a much more rapid pace now than in the past. For example, he noted the amount of information available to students was doubling every 18 months. Connectivists view technology as a scaffold that can replace or support the cognitive processes of students. Similar to social constructivism, connectivism suggests learning in a networked society is often an ill-defined process, occurring outside of the control of the individual. The theory differs from traditional learning theories by suggesting knowledge gains can occur outside of the human domain (e.g., machine learning) and this type of learning must be included in our understanding of how humans will learn in the future.

PROGRAM DESCRIPTION

The College of Education at the University of Central Florida (UCF) currently offers several web-based graduate special education degree programs. Program faculty and adjunct instructors are trained, certified and supported in online course delivery by the Center for Distributed Learning (CDL), a learning organization within the UCF's Division of Information Technologies and Resources. CDL services are provided systematically through a suite of required faculty professional development programs, frequent consultations, and technical support (Lee & Chen, 2013). Recognized as a leader in the fields of information technology and on-line learning, CDL has earned a Telly Award for excellence in video production, Davis Productivity Awards for new system development and software application, a Gold Award from the American Association of Webmasters, and a Sloan-C Excellence in Online Teaching and Learning Award. Go to the online@ucf website at http://online.ucf.edu/teach-online/ for more information about essential training and resources for teaching online.

CONTEXT

UCF also facilitates distance learning through the Office of Instructional Resources (OIR) which provides support for interactive video class delivery systems, videoconferencing, and web collaboration systems. In 2009, Exceptional Student Education (ESE) faculty consulted with OIR for assistance in purchasing a synchronous platform. Several possible tools for virtual meetings were analyzed (e.g., Blackboard Collaborate, Microsoft Lync, GoToMeeting, WebEx) with UCF adopting Adobe Connect. Currently, the majority of faculty who teach online hold Adobe Connect licenses, renewable on a yearly basis, through the UCF computer store. UCF's Adobe Connect website provides helpful resources and links to support the Connect Pro user, including a *Quick Start Guide*, a *Connect Pro Meeting Overview Video*, and a library of on-demand training, as well as the option to sign up for an *In-Person Training Session*, and links to the *Adobe Connect User Community*. The value of these supports is seen in the speed and ease with which faculty have applied this leading-edge technology to enhance connectivity in online courses.

TECHNOLOGY FORMAT

The Adobe Connect program, formerly known as *Breeze*, creates a virtual classroom environment providing both a dedicated web meeting room at a fixed web address and telephone conferencing for up to 99 participants. It supports webcams and works with Macs and PCs. Built on flash, there are no required plug-ins for participants to download in order to access or participate in a meeting; however, it is recommended that users download an "Adobe Connect Add In" program to enhance the experience of this synchronous technology within users' Internet browsers. Overall, bandwidth requirements are fairly low (minimum requirement is dial up) and screen sharing is fast (contingent on internet speed). To run Adobe Connect, computers need the following standard software: (a) an Internet browser (e.g., Explorer, Safari, Fire Fox), (b) Macromedia Flash Player (to upload documents quickly), (c) webcamera drivers (e.g., quickcam, lyncsys), and (d) updated Flash player.

Adobe Connect Pro is the synchronous platform that facilitates any live meeting including web seminars with a large audience and one or more hosts, small meetings for document sharing and collaboration, and the live virtual classroom where an instructor teaches inside the live meeting. The instructor, referred to as account administrator within Adobe Connect, creates the meeting on a home page, automatically generating a unique URL, and issues an invitation to participants. This can be done directly from the Connect Pro administration site or the URL can be linked inside an online course (see Figure 1).

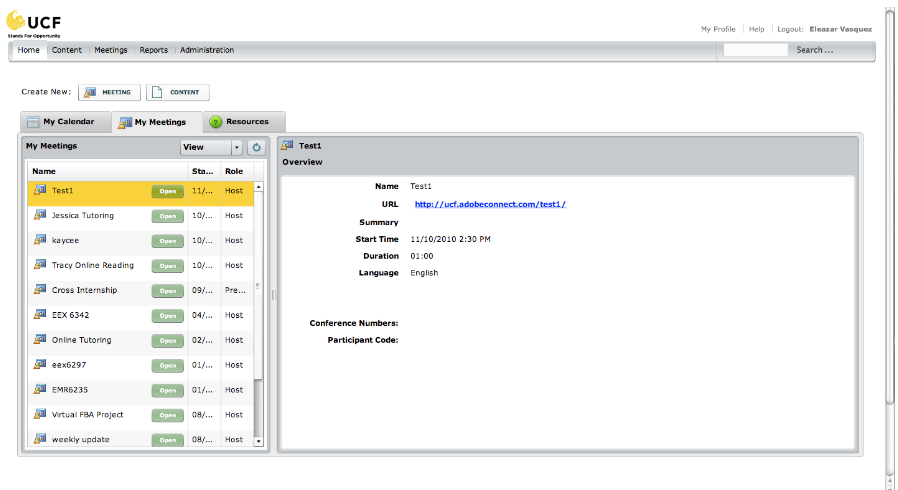

Figure 1. Adobe Connect Home Page with host-created meetings, Calendar, and uploaded content.

The administrator of each account has several options regarding the creation of any meeting. Administrators are able to create meetings with unique names for individual classes or let the computer create a random name. For a given meeting, they can choose a specific start time, meeting length, and increase or decrease the level of security. The administrator also can select the option to record a live meeting to allow asynchronous access to the information to students who are unable to attend at the scheduled time or to make it available for repeated viewings. Participant selection is critical, depending on whether or not the instructor wants students to have access to meeting room controls or to just attend a given meeting. The administrator can specify participants, presenters, and hosts for any meeting room created. Upgrading the status of a student or guest to either presenter or host provides them with access to microphone and document sharing pods within Adobe Connect for presentation of information.

Once a meeting room has been created, many options are available to the host. Instructors have the ability to customize the background with their own logos and color scheme. Adobe Connect meeting rooms also offer a variety of "pod" options to share and communicate with students. These pods can be configured according to the lesson or meeting purposes (see Figure 3 for example). The *Camera and Voice* pod allows the instructor or any other participant identified at the host level to turn on the web cam and voice. Up to five webcams can be used to display hosts; however, the more webcams used, the lower the video quality displayed and the more Internet bandwidth used. The *Attendee List* pod lists the hosts and students who have entered the meeting room and identifies each as one of three roles: (a) participant, (b) host, or (c) presenter. The host has the option to elevate a participant to presenter level allowing that participant access to controls and the ability to assume the instructor role. There is also a pull-down menu associated with the *Attendee List* pod that allows participants to make special comments or send messages to the instructor, such as a raised hand, agree or disagree, laughter, applause, or speak louder or softer. A popular feature for increasing student participation is the *Breakout Rooms: Configuration* option in the *Attendee List* pod. The instructor can assign up to 20 students to up to four discussion groups and then monitor interaction in all four groups. The *Chat* pod can be open to all or a moderated chat that only is seen by host and presenter who have the choice to make it public. Student responses also can be gathered through the *Poll* pod that allows for multiple choice or multiple answer responses to questions. Options for sharing information include the *Note* pod, the *File Share* pod, and the *Web Links* pod. The *Share* pod allows the instructor to share his or her desktop or files with the following formats: *.ppt, *.pptx, *.flv, *.swf, *.pdf, *.gif, *.jpg, *.png, *.mp3, *.html, or *.zip. There is also a whiteboard option that allows the instructor to superimpose drawings and notes over a PowerPoint slide or document. Go to UCF's Office of Instructional Resources Adobe Connect website at http://oir.ucf.edu/adobe-connect/ for additional information.

APPLICATIONS FOR TEACHING AND LEARNING

Many instructors at UCF have utilized Adobe Connect as a synchronous addition to Learning Management System (LMS) (e.g., Blackboard, Canvas, Moodle) for asynchronous content. As beginning users, several faculty started

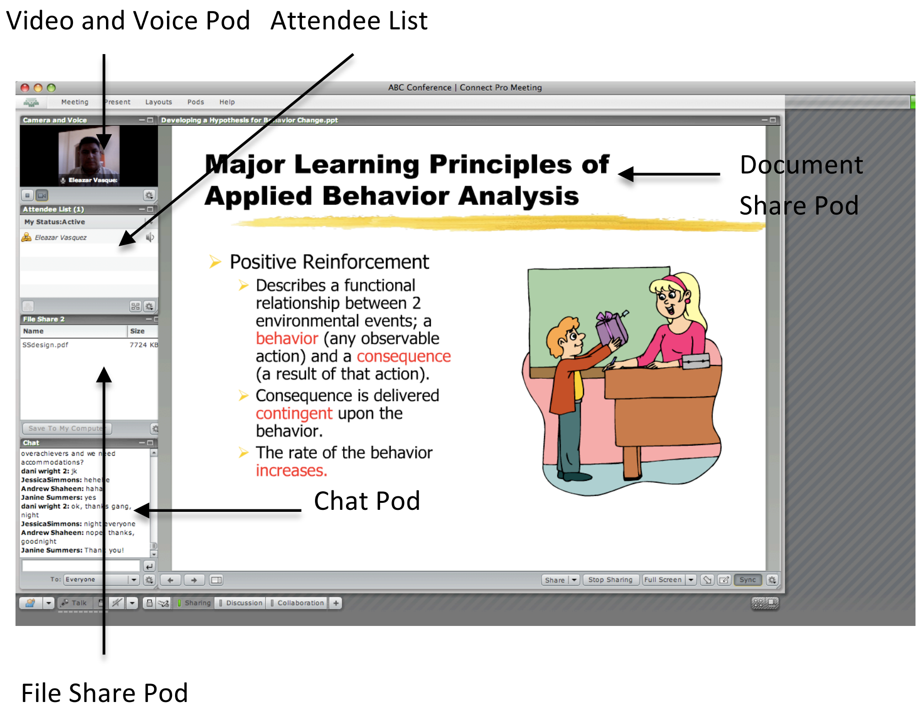

Figure 2. Example of Adobe Connect meeting room with video and voice pod, attendee list, Power Point sharing pod, file share pod, and chat pod.

with traditional lecture formats using the camera and voice, share and chat pods; however, they quickly moved on to explore the wide variety of other options available through Connect Pro. To fully appreciate this technology, it is important to recognize each instructor utilizes this tool in unique ways to connect with students, present course content, and meet individual needs.

Live seminars or lectures. Asynchronous modules can be greatly enhanced by incorporating live lectures. An Adobe Connect course orientation video or meeting prior to the first lecture is highly recommended so students feel comfortable with the program. First time users frequently begin with video-conferencing enhanced with a PowerPoint presentation. The instructor can use Adobe Connect to introduce himself or herself and provide an overview of the course objectives and requirements (see Figure 2 for example). The chat feature allows students to ask questions and make comments throughout the presentation. The poll pod also can be utilized to generate class participation, gain group consensuses, check understanding, or quiz responses over content. Most important, the instructor has control of any pod to reduce or increase the amount of student participation at any point during the lecture. In addition, instructors can efficiently share and disseminate materials by utilizing the file-sharing pod to provide students with access and the ability to download selected files.

Guest presenters. Guest speakers are a common feature of face-to-face course delivery. It can be argued that the opportunity to include guest speakers is even greater using Adobe Connect since obstacles, such as time and travel, are minimized. A good way to get comfortable with guest presenters is to solicit other faculty members to present on a given topic. All they need is a web cam and the URL to enter the virtual classroom and share their expertise with students. *Project ASD*, a federally funded personnel preparation project in UCF's Department of Child, Family and Community Sciences, supported the development of a fully online four-course Graduate Certificate in Autism Spectrum Disorders. One of the features of Project ASD is a Mentorship/Demonstration Classroom (MDC) program. To enhance interactivity in online coursework, mentors have been provided with webcams and, given presenter or host status, are able to present and interact with students in live course lectures/chats. Their presentations are further enhanced with video clips created at MDC sites, uploaded by the course instructors, and are easily accessed through Adobe Connect for use during the presentation and also available for asynchronous viewing through an Adobe Connect link in the course.

Two-way video conferencing. The use of Adobe Connect allows the instructor to add synergy to the LMS environment by increasing the participation of students beyond the chat feature. Student-to-instructor and student-to-student interaction can be further enhanced by elevating students to presenter or host status, allowing them use of the microphone and camera to present a variety of information. For example, in the graduate Behavior Management course, students present their functional behavior assessment data and outcomes in a virtual conference. When this course was taught in a face-to-face format, students presented live at the Annual ABC Conference (Garland, Vince-Garland, & Vasquez, 2013). Recognizing the value of this experience, it now has been translated into an online format. The instructor creates breakout rooms within Adobe Connect in which students deliver brief PowerPoint presentations summarizing their project outcomes and answer questions posed by classmates. Student as presenter also is used in the graduate Current and Critical Issues in Special Education course. The instructor uses the breakout rooms in the Chat pod to place students in groups. The members of each group collaborate to deliver a debate supporting or opposing a given topic. A one-on-one student-to-instructor presentation is another two-way video-conferencing option. In UCF's Assessment and Diagnosis course, students deliver a few subtests from the *Woodcock Johnson III tests of Academic Achievement* (Forbush, Stenhoff, Vasquez, Furzland, Alexander, & Stein, 2007; Vasquez & Straub, 2012). The instructor and teaching assistant act as the examinee, while the university student delivers the subtest. The instructor then provides feedback to students regarding the appropriate procedures, such as basal, ceiling, correct starting and ending locations, and creating rapport with participant.

Virtual office hours. Using two-way video conferencing, instructors can share computer screens, video and chat with individual students to answer questions, clarify online course content, provide assignment feedback, and trouble shoot technical issues. For example, in the UCF Behavior Management course, students are required to create a line graph with Microsoft Excel. Given the variance in MS Office versions, students sometimes have difficulties creating line graphs when the version of Excel they use does not follow the current version of Excel the instructor uses to demonstrate graphing skills. Adobe Connect allows instructors to view content on the student's screen for error correction and shaping of skills at a distance.

Field experience and internship observation. At UCF, Adobe Connect is widely used for internship supervision, significantly reducing the time and costs of transportation to multiple sites. The only cost involved is the webcam in the classroom. While these were provided to students in the past, as this practice has become standard, equipment purchase has become the responsibility of the student, with webcam cost estimated at approximately $100. In order to get a good view for lesson observation, a webcam on a stand rather than one mounted on the computer is most effective. The intern is able to direct the webcam toward the observation area for viewing in an enlarged camera and voice pod. The file sharing pod allows the instructor to review the lesson plan and share the lesson evaluation. Collaboration with school districts coordinated through UCF's Office of Clinical Experiences has been necessary to garner permission for classroom observations and assurances that intern observations are not recorded or shared have been helpful in gaining school district support.

CONCLUSIONS AND RECOMMENDATIONS

Adobe Connect offers several benefits to university faculty, students, and community connections. First, it is cross-platform compatible. Given all content is delivered via the Internet, any computer with Internet connection and web browser of the user's choice can access meetings, content, recordings, and files. The only access requirement is the unique URL created by the account administrator. Second, Adobe Connect offers a password-protected site to host all meetings, recordings, and content delivered over the system. Faculty and school administrators have reported that they appreciate the security of Adobe Connect. A third benefit is the ability to record and store synchronous meetings, an important feature in the case of students who are unable to participate in the live session. The record option also allows the instructor to deliver prepared content, such as directions for an assignment, consistently.

As with any technology, there are limitations in utilizing Adobe Connect. The distribution of the cost for Adobe Connect licenses varies considerably from university to university. UCF requires that instructors purchase their own licenses at an individual cost of $150 per license, whereas, at other universities, a department may hold the license and offer faculty access at no individual cost. Another limitation of Adobe Connect is the use of Flash to run the meeting and display content. Since some mobile devices do not currently support Flash, the participation of users may be impacted. Also, as with all Internet-based applications, the quality of video and audio may vary contingent on the quality of internet connection available to each participant. Adobe Connect developers recommend the use of broadband Internet connection as a minimum requirement; however, even with broadband, faculty report feedback can be a problem with multiple presenters using the microphone. Student-to-student interactions are also a challenge with large classes since the breakout rooms for the chat pod only will accommodate 50 students. As with face-to-face instruction, there are classroom management issues. In particular, students can log on and appear to be participating when they are actually away from the computer doing other things. Another participation issue stems from UCF policy discouraging required attendance at live chats in web courses. Unfortunately, student attendance may be low at live meetings when participation is optional. Faculty recommended best practices to minimize the challenges of virtual classrooms that include the following:

- Start small adding new tools/pods over time.
- Post the schedule for required synchronous class meetings at the beginning of the course.
- Consider incentives such as extra credit for attendance at optional live class meetings.
- Offer live participation in a synchronous class meeting as an alternative to completing a specific course assignment.
- Provide students with a list of ground rules for participating in the virtual class. For example, you may or may not want to limit chatting during instructor-led activities.
- Have students review reading assignments and materials prior to class to promote greater understanding, discussion, or collaboration during the virtual class.
- Create an attendance sheet of enrolled participants to determine when all or most of your registered students have arrived.

- Preload materials (e.g., power points, polling questions, etc.) into the virtual classroom.
- Allow for small group discussion and collaboration by using breakout rooms.
- To avoid technology barriers to successful communication, arrange a conference call as a backup or alternative to using the built-in Adobe Connect voice feature.
- Prepare the physical classroom or office to limit distractions such as noises, phones, and visitors during virtual meetings.
- Use the recording option to allow reviewing of your instruction for self-evaluation.

Informal interviews with Connect Pro users revealed unique preferences and usage patterns. While all faculty reported use of the basic meeting components, including camera and voice with file sharing for course lectures, each instructor indicated preferences for specific features, such as breakout sessions, the ability to elevate students to presenters for debates, or video sharing, quick tutorials for assignment guidance. Interviews revealed a common appreciation for the flexibility afforded by Adobe Connect to adjust the meeting room to match the instructor's teaching style. Most important, they produced a wealth of anecdotal evidence suggesting both instructors and students enjoy the increased connectivity synchronous sessions provide.

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RESOURCES

Online@UCF http://online.ucf.edu/
Adobe Connect at UCF http://www.oir.ucf.edu/index.php?q=ucf_connect

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Chapter 4

INTEGRATED ONLINE TECHNOLOGIES FOR PROGRAM DELIVERY AT WEST VIRGINIA UNIVERSITY

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PROGRAM DESCRIPTION

The Department of Special Education at West Virginia University offers an online graduate certification and/or degree program in six areas of specialization: (a) Autism Spectrum Disorders; (b) Early Intervention/Early Childhood Special Education; (c) Gifted Education; (d) Low Vision/Blindness; (e) Multicategorical Special Education; and (f) Severe/Multiple Disabilities. All courses in all program options are offered entirely online, using a combination of live online class sessions from 5-7 pm Eastern Time on alternate weeks plus multimedia content modules and other learning activities available on demand with scheduled due dates across the semester. Field and clinical experiences are arranged in the students' home communities, with on-site supervision by local personnel and online supervision by university faculty. Students do not need to come to campus for any part of the program; they apply for admission, register, take courses, complete field and clinical experiences, seek advising, and apply for graduation online and can even participate in the graduation ceremony through a live webcast. Although this program was designed to serve prospective and practicing teachers throughout the state of West Virginia, it also enrolls students from many other states and several international locations.

CONTEXT

West Virginia University is a major university with nearly 30,000 students that has high research status and also serves as the state's land-grant institution. The College of Education and Human Services has offered coursework in special education and gifted education on and off campus for over 50 years. The Department of Special Education offers a variety of undergraduate, graduate and doctoral programs with 12 full time faculty members and additional adjunct instructors. West Virginia, the only state that lies entirely in the Appalachian region, has a population of 1.85 million that is 92.5% white and 17.9% living in poverty with a density of 77.1 people per square mile (U. S. Census Bureau, 2014). The Rural Policy Research Institute (2010) reported that census data show 55% of West Virginians live in rural areas while 20% live in small towns and 25% live in urban areas. For over two decades, the West Virginia Department of Education has consistently listed ALL areas of special education (including gifted education) as teacher shortage areas (U. S. Department of Education, 2015). Last year, 14% of special education positions were unfilled and an additional 5% of positions were unfilled or filled by personnel on permit or out-of-field authorizations (West Virginia Department of Education, 2015). The urgent need to address these critical shortages has driven much of the personnel preparation effort of the state's colleges and universities and was the major impetus for development of online teacher education programs.

The WVU Department of Special Education has been engaged in distance education delivery for over 30 years (Ludlow & Duff, 2010). In the early 1980's, special education faculty adopted a field-based model of certification program delivery by traveling to off-campus sites to offer coursework at extension centers and developed an on-the-job practicum model to allow working teachers to complete field and clinical experiences in their own classrooms. When the state made distance education technologies available for education in the 1990s, faculty began to offer courses first by live satellite broadcasts and later by interactive television. A decade ago, WVU became one of the first universities to offer courses online in real time when it began using live webcasts of class sessions in some programs (Ludlow & Duff, 2002). In 2006, faculty made the decision to offer all graduate certification and degree programs online, with all courses to include at least some class sessions online in real time, using the new desktop conferencing technology that had recently become available (Ludlow, Galyon Keramidas, & Landers, 2007). Unlike the previous delivery models, in which the need for specialized equipment limited the number of participating sites, the fully online delivery model allowed the program to be accessible to any school or home throughout the state and opened up the possibility of expansion to other states and international areas. Through its participation in the Southern Regional Education Board's Electronic Campus, WVU is able to offer these programs to students at the same low resident tuition rate, no matter where in the world they live.

TECHNOLOGY FORMATS

Aynschronous (On Demand) Technologies

WVU uses the online learning management system known as Blackboard Learning System™, branded as WVU eCampus. This system includes an array of tools for content development, learner interactions, learning assessment, and course management. Instructors can create and manage a syllabus, learning modules, threaded discussion forums, blogs and journals, assessment forms, assignment dropboxes for individuals or groups, grading rubrics, and a grade book. A tracking feature allows the instructor to monitor student participation in the course.

The eCampus system provides a variety of additional tools that faculty can use to customize their courses, such as Blackboard Collaborate™, a web conferencing program that features tools for audio- and video-conferencing, presentations, and application sharing; Turnitin®, a plagiarism detection program; Respondus® Lockdown Browser, a custom browser that locks down the computer to prevent cheating during testing; and content links to major publishers such as Pearson, Wiley, McGraw-Hill, and Cengage. Faculty can also add a link to the WVU online library and electronic reserves or to the online Student Evaluation of Instruction (eSEI) form. The WVU Service Desk provides assistance by phone and email 7 days per week at peak use hours.

Instructors use an online request system to create a new course or to revamp an existing course on the eCampus development server at any time prior to the beginning of the semester. About 1 month before the first day of classes each semester, an empty shell is created for all WVU courses and faculty can transfer content from the development server or from a previous semester before the start of the new term. WVU provides training sessions, online tutorials, and staff at the WVU Teaching and Learning Commons to assist faculty with course development and delivery. WVU Online also offers small grants to assist faculty

Synchronous (Real Time Technologies)

Wimba Classroom™, a full-featured virtual classroom program that allows real time desktop conferencing with voice, video and text, using Apple QuickTime™ and Adobe Flash™ media players, is used to deliver live, interactive online class sessions. This system was selected because it can be accessed by users with only limited bandwidth and low speed connectivity, as is often found in the predominantly rural WVU service area. The university pays a license fee to use the software on the company's servers and instructors and students only need to download and install the free media plugins. A Setup Wizard walks new users through several easy steps to ensure their computers are correctly configured and ready to access the virtual classroom. The user interface is fairly intuitive and the tools for presentation and interaction are relatively easy to learn and master.

Content presentation tools. These tools include a display window for showing presentation slides, web sites and video segments, an electronic whiteboard, and application sharing. The instructor can create materials in advance (such as presentation slides, images, web sites or video clips) and upload them to the system in advance for use during the class session. The instructor also can create materials during the session using the electronic whiteboard or show content on his or her own computer desktop.

Participant interaction tools. These tools include real time audio and video streaming, text chat (public and private), response indicators, break out rooms for small group discussions, and polls, quizzes and surveys. To talk, participants can use a computer's internal microphone and camera or attach an external microphone and camera, following simple directions for syncing them to the program. The WVU program recommends that instructors and students use an inexpensive headset to minimize extraneous sounds that can cause feedback in the transmission. When the video conferencing tool is activated, streaming video of the speaker appears in a floating window next to the main window. This video stream is half duplex (one way at a time), which uses much less bandwidth and makes video conferencing accessible with most computers and Internet connections. Students who experience technical problems also can access the class by telephone with a toll free number. Response tools can be selected by students to raise a hand to request permission to speak and indicate yes or no. The instructor can create breakout rooms and send students in small groups to engage in discussion or complete activities, then return to the main room to share outcomes with the whole class. The assessment tool allows the instructor to collect information about student responses (individually or anonymously) through selection items or composed responses and to display the results of polls to all participants. The instructor also can turn control of the classroom over to the students who can upload materials and make presentations using all tools or manipulate software programs on the instructor's desktop.

Course management tools. These tools include allow the instructor to archive the class sessions, create content, control access, and view participant data. The archive tool can be used to record and save a class with the click of a button or to pre-record and post a class if desired. Archived sessions can be released to students as links to be viewed on a computer within the system (to protect copyrighted content or confidentiality of guests) or can be made available as downloadable MP3 files (for access by mobile devices). The access tool allows the instructor to create a link to grant guest presenters or participants temporary access that can be sent to them embedded in an email message. The records tool provides the instructor with information about student attendance and participation throughout each session.

APPLICATIONS FOR TEACHING AND LEARNING

Online Courses and Live Class Sessions

Real time class sessions. All courses include live, interactive online class sessions conducted online using the web conferencing tool, Blackboard Collaborate™. These class sessions typically are scheduled on alternate weeks across the semester on a single night from 5-7 pm Eastern Time. In most class sessions, the instructor provides a lecture illustrated with presentation slides and sometimes a display of images (e.g., photos of assistive devices or screen shots of Braille symbols), web sites (e.g., information about alternate assessment or sample transition plans) or video segments (e.g., math problem solving instruction or feeding techniques demonstration). Students can download the presentation slides in advance and use them as a guide for note taking during the class. Instructors may use the video conferencing tool as a document camera to display materials (e.g., textbook for the course or assistive devices). Sometimes, instructors invite guests with specific expertise (e.g., parents of children with autism, gifted high school students, or secondary math teachers) to participate in an interview or present a short content segment. Instructors typically intersperse lecture with activities, including large group discussion or small group discussion in the breakout rooms, often using activity sheets (e.g., case studies) that students downloaded prior to class. They may ask the whole group to respond to questions using the response indicators (e.g., indicate "yes" or "no" to indicate whether you approve of physical punishment) or use polls at intervals during the class to obtain and compile individual responses to monitor how well students understand the content (e.g., Select the behavior that is an instance of generalization.) Occasionally, instructors may share an application on their desktop for students to complete an activity (e.g., create a graph of behavior using a spreadsheet program). The versatile and easy-to-use tools in the virtual classroom program allow each instructor to accommodate his or her personal teaching style and customize materials class sessions to best represent the topics and issues they need to address.

On demand learning activities and assessments. All courses include some combination of activities that students complete online in eCampus on their own time by a due date specified in the course syllabus. These activities include interactions with content through multimedia learning modules designed by the instructor for the course or links to web-based modules created by others but related to course topics (e.g., IRIS Star Legacy modules (see http://iris.peabody.vanderbilt.edu) or KidTools (see http://kidtools.org). Most instructors build in interactions with the instructor and other students by means of threaded discussions, reflective journals, and blogs or wikis. Instructors create learning assessments such as self-graded or instructorgraded quizzes or exams (timed or untimed), individual or group assignments such as reviews or reports, term papers, and collaborative projects, all submitted through a dropbox. Most courses involve a field experience of from 5-30 contact hrs in a public school to complete assignments with prescribed activities related to course content that require contact with students with exceptionalities in a public school system. The host teacher verifies student completion of these activities and the instructor documents satisfactory performance by reviewing a product submitted by the student. Instructors also create an electronic grade book for each course that can record discussion/journal/blog, quiz/exam and assignment scores automatically or allow entry of other scores (e.g., class participation). The grade book allows students to see their progress at all times and calculates the total points at the end of the semester so the instructor can assign the final grade. In some courses, these assessments also represent the key assessments that are required for national recognition by the Council for Exceptional Children (CEC) and accreditation by the Council for Accreditation of Educator Preparation (CAEP), so they must be submitted to and rated on a rubric in the LiveText™ online assessment system so that the data on student performance in the program can be reviewed by all faculty at the end of each year and submitted to the accrediting bodies.

Online Practicum Experiences and Live Conferences

Real time activities on site and online. All certification programs require completion of a 16-week culminating clinical experience, called a practicum, at the end of the program. Practicum involves a full semester (16 weeks, all day, every day) of placement in a public school with students in the appropriate area of specialization and at the appropriate grade level, during which time students must demonstrate satisfactory performance of all program competencies to meet state standards established by the West Virginia Department of Education and national professional standards established by the Council for Exceptional Children. Students who are employed as special educators may complete an on-the-job practicum in their own classroom with peer supervision by a colleague. Other students complete practicum in a model classroom in their home community with supervision by a master teacher. The cooperating professional provides on-site supervision by completing six (6) or more live formal observations (in addition to other informal observations) across the semester, conducts conferences to provide feedback and suggestions for improvement, and submits an online report after each observation. Each student is assigned a university supervisor, a faculty member with expertise in the area of specialization, who provides online supervision during practicum experiences. Supervisors hold 3-6 live, interactive online conferences 20-30 min in length in Blackboard Collaborate™ to confer and collaborate with each assigned practicum student and cooperating professional at intervals and ensure that the student is making adequate progress to complete requirements successfully by the end of the semester. Supervisors submit an online report after each conference. At the end of the semester, the cooperating professional completes the Performance Assessment Instrument to rate the student's overall proficiency on each professional standard.

On demand activities for assessment. Students in practicum experiences complete a variety of online activities in eCampus to demonstrate that they are proficient in program competencies and meet all standards. They engage in reflective exercises to articulate their professional beliefs, identify characteristics of their placement site, prepare an individual practicum plan for completing requirements, conduct observations in other classrooms to compare classroom demands and teacher effectiveness, engage in group discussions with other teachers, and maintain a reflective journal across the semester. They also prepare a professional portfolio with reflections to address each professional standard and a collection of artifacts to document their proficiency. Students develop their professional portfolios offline and upload the reflections and artifacts into LiveText™, where they are reviewed and scored by the university supervisors rating each student's overall proficiency on each professional standard. Both the professional portfolio and the performance assessment not only represent key assessments for the program, but they also serve as the final programmatic assessments, since practicum also serves as the capstone course for the Master's degree program. University supervisors enter scores for each assigned student for all completed activities into the online grade book. The practicum coordinator oversees all aspects of the practicum, monitors all personnel, and assigns the final grade at the end of the semester.

CONCLUSIONS AND RECOMMENDATIONS

All faculty members in special education at WVU have successfully used integrated online technologies to develop and deliver online courses and field and clinical experiences in graduate certification and degree programs across the state, throughout the U. S., and in several international locations. Through the use of multimedia materials, multiple learning formats, and a combination of real time and on demand instructional activities, they have created programs that are accessible, high quality and reasonable cost. These programs have now prepared several hundred individuals who are fully certified and highly qualified, and employed in rural schools in various areas of specialization within special education and who hold Master's degrees in Special Education that ensure greater competitiveness, higher salaries, and more advanced career options.

Recommendations for Practice

Suggestions for using online in real time technologies effectively include:

- Plan course activities to reflect professional beliefs and personal teaching styles and find the technology tools to meet those needs;
- Use multiple media to engage students in the content;
- Interact with students frequently during live class sessions by means of audio or video chat, response indicators, and polls to support and assess learning;
- Call on all students in a systematic way so they must respond during live class sessions to prevent some students from choosing to participate or refusing to engage;
- Prepare all materials in advance so they are easily accessible by the instructor and students during live class sessions;
- ALWAYS be on the lookout for new technology tools and find ways to incorporate them into courses to create ever better learning experiences;
- NEVER adopt the attitude that technology cannot be used with some instructional methods or for some content topics; and
- Read publications and attend conferences to learn more about the creative ways colleagues at other institutions of higher education are using new technologies for online instruction.

Future Directions

In 2011-2012, based on the success of the online Master's degree programs, the faculty made the decision to conduct a pilot project to offer the doctoral program leading to an Ed.D. in Education with a major in Special Education entirely online. In Fall 2012, four students were admitted into the pilot project to enroll in seven (7) credits per semester (Fall, Spring and Summer) while they continued their full-time employment across a four (4) year period; although two students dropped out in the first semester due to personal issues, the other students completed all coursework successfully and are now preparing to present their dissertation research proposal for approval by faculty committees. In Fall 2015, faculty admitted a new cohort of four (4) students into a second round of the online doctoral program; the program is currently accepting applications for admission in August 2016. Although they recognize that mentoring of doctoral students and supervision of teaching, research and service activities present new challenges to address and problems to solve, faculty believe their extensive experience with real time and on demand teaching and learning makes them especially well qualified to ensure the success of this program in the coming decade.

More recently, the WVU Department of Special Education was authorized to begin planning for a new area of specialization in Deaf education to be incorporated within the online graduate certification and degree program. Faculty have begun the work of developing collaborative agreements with state agencies, designing program components, preparing syllabi, and writing program proposals for university and state education agency approval for this program. A Deaf education program presents unique issues, such as teaching American Sign Language online and at a distance and providing adequate exposure to Deaf mentors so students at a distance can practice sign and learn about Deaf culture. Nevertheless, the department's goal is to offer this program option along with all the other online programs in the next few years.

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LIST OF RESOURCES

Blackboard Learning System™:
http://www.blackboard.com/Platforms/Learn/Overview.aspx
Blackboard Collaborate™:
http://www.blackboard.com/Platforms/Collaborate/Overview.aspx

Turnitin for Educators: http://turnitin.com
Respondus Lockdown Browser:
http://www.respondus.com/products/lockdown.shtml
LiveText™ Assessment System: https://www.livetext.com

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Chapter 5

VIRTUALLY THERE: ADDRESSING COMMUNITY AND CULTURE THROUGH WEB-CONFERENCING IN HAWAII AND THE PACIFIC ISLANDS

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PROGRAM DESCRIPTION

Located in the middle of the Pacific Ocean, the University of Hawaii at Manoa (UHM) serves students on the islands of Hawaii as well as students who live in island communities across the Pacific region. The university's outreach includes small island nations and territories scattered across five million square miles of ocean. Some of these islands, such as American Samoa, the Federated States of Micronesia, the Republic of the Marshall Islands, Guam, and the Commonwealth of the Northern Marianas Islands, have historical and political affiliations with the United States. As a result of these affiliations, many Pacific islanders enroll in degree programs at U.S.-based universities, such as the University of Hawaii.

The UHM College of Education (COE) provides teacher licensure and graduate degree programs in special education. Distance learning initiatives using a variety of telecommunication technologies have been a necessary and practical way for the COE to reach students in the rural and remote settings of the islands we serve. As new technologies evolve and emerge, the COE has embraced the opportunity to find innovative and responsive ways to design and deliver courses and programs. The COE has purchased licenses for Blackboard Collaborate, a web-conferencing system. Every faculty member is provided with a "virtual classroom" on Blackboard Collaborate, which is accessed by clicking on a weblink. Technology training staff at the COE provided training and ongoing support for faculty as they learn how to use the web-conferencing system as a teaching tool.

In this chapter, we describe how we, as instructors of special education courses, have been using this synchronous technology to create virtual classrooms in our special education courses. Using web-conferencing as an integral part of course delivery, we seek to create synchronous instructional environments that allow us to address and include the diverse backgrounds and experiences of our students in Hawaii and in the Pacific. We use the virtual classroom environment to create learning communities in which students discuss and reflect on issues in special education in the unique local settings of the rural and remote communities in which many of them live and work.

Culture and Community

Our students include Pacific islanders (e.g. Samoan, Chamorro, Marshallese, Pohnpeian, Chuukese) and students of mixed heritage, descendants of the Asian and European immigrant groups who have settled in Hawaii and the Pacific islands. Included in this mix are our "local" students of Hawaiian and mixed ethnicities and recent arrivals from the continental U.S. Students from the continental U.S. must simultaneously learn to negotiate the diverse cultural environments of Hawaii's schools and rural communities while completing their teacher training program.

Our online students who live in the U.S.-affiliated Pacific islands are from indigenous communities. As these Pacific island communities integrate with the modern world due to travel, telecommunication, and technology, members of these communities remain deeply rooted in traditional cultural values and lifestyles (Gmelch et al., 2001). Students live in rural village-based settings and many speak English as a foreign or second language. For students from indigenous cultures, community-based knowledge and lessons learned from elders are an important source of informal education that is often ignored in distance education courses.

As instructors, we are aware that we are teaching not only content but also addressing the varied realities of our culturally diverse populations and settings. As course designers, we take into account the cultural contexts and backgrounds of our students. When delivering our courses to students on Pacific islands, we strive to respect and integrate community and traditional knowledge and include dialogue about our students' unique local settings.

In this chapter, we describe three courses in our special education program in which we have incorporated synchronous virtual classrooms as a way to create learning communities and to integrate real time discussions about the local and cultural contexts of our students. During our virtual class sessions, we use constructivist methods, incorporate multimodal resources, and integrate narrative and dialogue into our pedagogy. Researchers who have examined appropriate instructional design for culturally diverse and indigenous learners (Henderson, 2007; Hughes & Dallwitz, 2007; McLoughlin & Oliver, 2000; Zepke & Leach, 2002) recommend the use of collaborative and community-based learning approaches. These approaches are consistent with social constructivist theories that emphasize the importance of learning with a peer group and incorporating background knowledge. In studies evaluating effective practices for distance learning with indigenous populations, students in rural and remote settings concur that they feel supported by and value the connection made possible through synchronous virtual class sessions (Ho & Burniske, 2005; Rao, Eady, & Edelen-Smith, 2011).

Strategies for "Virtual Class" Meetings

As we designed the courses described in this chapter, we considered how to use a combination of asynchronous and synchronous technologies to effectively teach course content and to foster interaction. We used an online course management system (CMS) for asynchronous interactions such as posting announcements, assignments, and course resources. The CMS was a central location where students could log in to find course information and resources and to and upload their completed assignments at their convenience.

We sought to integrate the synchronous web-conferencing tools along with the asynchronous components of our courses in a meaningful way. Our objectives for integrating weekly synchronous virtual class sessions was to enhance what students were doing each week independently and to add a human presence to the online course. Because learning is a social activity we sought to create a sense of community and to add a personal touch through live discussions and collaborative interactions between students and instructors. The virtual class sessions were 2-2.5 hours long. The instructors were located in Honolulu on the island of Oahu (the major population center for Hawaii). The students in the courses we describe were located in the Republic of the Marshall Islands and CNMI (Courses 1&3) and the Big Island of Hawai'i, Kauai, Molokai and Maui (Courses 2 & 3). We describe strategies that we used during our synchronous virtual class sessions that build learning communities, incorporate culture, narrative and dialogue, and foster interaction between online students and instructors.

Course 1: "Introduction to Exceptionalities"

For a general survey course, "*Introduction to Exceptionalities*" in which students get an overview of the characteristics of various disabilities, we used multimedia resources as a basis to teach content and design collaborative activities. Since this was one of the first special education courses that students enroll in when they start their degree programs, we felt that, in addition to the facts about each disability, the course should convey values in the field of special education. We sought to emphasize the importance of advocacy and inclusion of children with disabilities. The students enrolled in this course lived in the Republic of the Marshall Islands and the Commonwealth of the Northern Marianas Islands and were nontraditional learners. In some Pacific island communities, children with disabilities are "protected" and hidden away. One of our objectives was to raise awareness about inclusion and about the potential for individuals with disabilities to participate in society.

To convey these concepts, we used movies that depicted disability issues as a supplement to the textbook. The textbook for the course introduced disabilities by category and provided basic information on the education and inclusion of individuals with the disability. The instructor carefully selected the movies, choosing ones that included respectful depictions of individuals with disabilities and had instructional value in teaching about disability and inclusion. Students watched these movies (such as "Educating Peter," "The Miller Twins," "My Left Foot") before meeting for the virtual class session each week. They also read a corresponding chapter in their textbook to learn more about the disability depicted in the movie.

Because many students in our rural and remote locations lacked reliable Internet access and computer resources in their homes, students on each island gathered together in a central conference room to attend the weekly virtual class with the instructor, who was located in Honolulu. Students logged into Blackboard Collaborate on one computer, projected it on a screen, and interacted as a group with the instructor, using audio and text features of the web-conferencing system. Students shared one microphone hooked up to the main computer.

The instructor used the virtual class time to discuss the textbook readings, to reflect on the movies, and to foster an interactive and engaging discussion with students. She created a visual presentation that included images (screen shots) from the week's movie and key questions about the individual depicted in it. The instructor began each class session by summarizing the movie informally, taking about 10 minutes to retell the story and focus on key points. After this summary, students discussed what they learned from the movie. This resulted in a rich dialogue between instructors and students in the web-conferencing environment. Students took turns talking about their ideas and impressions using the audio feature of Blackboard Collaborate. They also used the text box to write comments as their peers or instructor were talking.

These discussions in a synchronous environment created a forum in which students could exchange ideas with each other and share their sometimes emotional and powerful reactions about the issues depicted. In contrast to a written or asynchronous discussion, the opportunity to address these emotional topics in real time resulted in lively dialogue with lots of spontaneous commentary and questions. Students learned from each other's ideas, and their curiosity and interest in a topic became apparent as they asked questions of the instructor to clarify and extend upon a discussion.

After the large group discussion, students worked in small groups to connect concepts to their local settings and cultures. Students worked in groups of 3 or 4 and chose one question (out of a pool of 6-8 questions) posed by the instructor. The questions were designed to prompt students to consider the topics we discussed in class in the contexts of their own communities and cultures. For example, after watching the film "Educating

Peter" about the inclusion of a child with Down Syndrome, one question was, "How would Marshallese parents feel about their child with Down Syndrome joining a general education classroom?" Students would take about 15 min to discuss the question in a small group and then report back to the larger group. Though the language of instruction was English, the instructor encouraged students to speak in their first language in their small groups if they chose. This small group activity, which we called "Teach Us," allowed the instructor to learn about the perspectives of disability that the students had in their local contexts and communities. It gave students the opportunity to extend what they had learned in the movies and readings and consider how those ideas may relate to their community contexts.

In course evaluations, students discussed the value of the movies, the discussions about the movies and the weekly small group connections to their own communities. Students said they felt an emotional connection to the stories depicted in the movies, and some students noted that it inspired them to be advocates for children with disabilities in their communities. They also valued the "Teach Us" activities because it gave them a chance to collaborate with each other and discuss issues relevant to their local communities. They enjoyed reporting back to the instructor on their small group discussions and appreciated the opportunity to reflect on and share information about their own cultural and local contexts. Most of our students in this course were not native English speakers, and they concurred that it helped tremendously to learn course content through movies and dialogue instead of learning solely through textbook reading.

Course #2: "Literacy Strategies for Students with Mild/Moderate Disabilities"

Literacy Strategies for Students with Mild/Moderate Disabilities is a required course for all Post Baccalaureate and Master's level students in our department's teacher training program. Students enrolled in this course are teachers-in-training at the middle or secondary level and live on the various islands of the state of Hawaii. Most students live in rural settings and small communities; a few were from the more urban settings of the main island, Oahu.

The content of this class focused on pre-reading, during reading, and after reading strategies across content areas. While the instructor used a variety of tools/media to deliver the content of the course and to communicate with the students, the primary method of interacting with students was in weekly virtual class sessions during which students met as a large group of 25 students online.

Instead of using a textbook, the instructor used a variety of resources to introduce students to course content. Students were required to read articles (uploaded to the course management system in PDF form) and visit relevant websites. Multimedia presentations and interactive websites were used to reinforce the readings (see examples in sidebar).

Each weekly virtual class session began with an activity to engage the large group by requiring them to reflect and weigh in with individual responses. The instructor used the "polling" feature of Blackboard Collaborate to check for

Podcasts and videos from professional or research organizations:

http://www.literacyworldwide.org/get-resources

IRIS Center Modules:

http://iris.peabody.vanderbilt.edu

Simulations:

http://www.pbs.org/wgbh/misunderstoodminds/intro.html

Assessment & Measurement Tools, such as the Readability Calculator:

http://www.readabilityformulas.com/free-readability-formula-tests.php

Other resources, such as Visual Thesaurus:

http://www.visualthesaurus.com

understanding of the assigned reading for that week as a warm-up activity at the beginning of class. The students' individual responses were collected by the system, and the instructor instantly published the aggregate class results and responses. Students enjoyed answering the "spot poll" questions that reviewed the week's concepts, an activity that let them participate as individuals and see their answers as a collective.

After the initial check in, the instructor briefly summarized the week's topics before doing a small group activity using Blackboard Collaborate's "breakout room" feature. The breakout rooms separated the large group into smaller groups of 4-5 students (pre-selected by the instructor). Within their breakout rooms, students could use audio and text to interact. The instructor could go between all the breakout rooms, listening in to the various small group discussions.

Nehme (2008) noted that collaborative group activities require students to be attentive, follow instructions, and apply what they learned by actively engaging in exercises. The breakout room activities gave students the opportunity students to have meaningful interactions with each other, share their background knowledge, and bring their personal experiences and perspectives into the virtual classroom.

The instructor employed a variety of instructional strategies within the "breakout sessions," designing activities that reinforced the content for the week. These included (a) guided discussions, (b) "expert" presentations by group members on assigned topics, (c) practice administering literacy assessments, (d) group problem-solving, and (e) spontaneous discussion and brainstorming. Each strategy is briefly described in the following paragraphs.

For the guided discussion activity, the instructor provided questions that prompted each small group to discuss the articles they were reading on topics, such as literacy across content areas, research-based intervention strategies, and culturally-relevant curriculum. The discussion questions were designed to foster evaluation, analysis, and synthesis of the assigned readings.

For the "expert" presentations, each student was assigned a specific topic (related to pre-, during, and post-reading strategies) and given a few weeks to research the topic and create a short 10-15 min presentation. In their breakout room groups, students acted as "experts" on their topic, sharing and discussing what they learned with a forum of peers.

To practice administering assessment measures, students tried out assessment strategies in their small groups. For instance, students took turns reading a 1-min passage that they then scored to measure each other's fluency. Another breakout room strategy was to have each group problem-solve a short case study. After the breakout sessions, the class "reconvened," and each group shared their solutions. The students were intrigued by the fact that the same case study could generate such varied solutions. A final breakout room strategy was to allow time for brainstorming and discussion on topics of interest. The brainstorming sessions arose from issues that students brought up in class, reflecting their diverse backgrounds and cultural contexts. While the other strategies described above required planning and preparation by the instructor, the final strategy was spontaneous and student-generated.

The class evaluations were positive regarding the use of the breakout rooms. A majority of the students listed their participation in the small group sessions as being the "most valuable" aspect of this online class. The breakout rooms created a more intimate venue for sharing and discussing information, and some students stated that they felt more comfortable speaking up in groups of 4 or 5 than they did in the larger group of 25 students.

Course #3: " Classroom Organization and Management"

For a "*Classroom Organization and Management*" course required for all students in our teacher training programs, we used a narrative storytelling strategy during virtual class sessions as a way to learn about and reflect on principles of behavior and classroom organization and management. The students, many of them new teachers, immediately recognized the significance of the course, as behavior management represents one of the greatest challenges for most new teachers. The instructor developed strategies that allowed students to share stories of behavior management challenges in their classroom settings or from past experience. Students' actual stories became part of the instructional dialogue during the virtual class session, allowing students to brainstorm and generate collaborative solutions within their learning community.

Each week, the students completed reading and writing assignments in an asynchronous environment prior to the weekly virtual class session. They were assigned to read chapters in their textbook as well as a story about an actual classroom management challenge. For the first 4 weeks of the class, they read stories authored by the course instructor, describing his own early classroom experiences. In the threaded discussion of the course management system, students wrote a reflection on some element of the posted stories. They were free to offer their opinions and knowledge and were asked to make connections with their personal and professional lives (either from their childhood schooldays, as a parent, or now as a beginning teacher). During the weekly virtual class sessions, the instructor summarized the story for the week and led a discussion about the story. He selected interesting anecdotes and comments from the students' written responses and presented those during the session as well. Students who had written the elected comments were asked to discuss and expand upon their comment.

Once students became familiar with this process of reading a story and writing comments each week, the instructor asked them to write a story of their own. Students were asked to describe a behavior management challenge they had directly experienced in their classrooms or personal lives. In addition to writing a short narrative story (3-5 pages), students were required to outline the story in 5-7 PowerPoint slides. The instructor provided loose guidelines about the storytelling format. Students were guided to include descriptions of characters, setting, problem, resolution (if there was one), and lessons learned. The story did not need to have a successful resolution, but it had to be real - either from their present day classroom or from prior first-hand experience.

Students submitted their stories to the instructor, providing him with a "story bank" of various real life tales from which to choose for the weekly virtual class meetings. Students were aware that their stories might be selected to be shared with the whole class during the virtual class session. The instructor selected 5-7 stories each week and posted them for everyone to read. The instructor chose stories that illustrated behavior management concepts from the textbook (e.g., contingencies of reinforcement, reinforcer identification, parent-teacher-student communications, professional collaboration, etc.). Priority was given to genuine, heartfelt stories that would generate empathy, creativity, cross-cultural discussions, and problem-solving among beginning teachers. Before each week's virtual class session, each student was expected to post a written comment on at least two stories in the threaded discussion. The instructor urged students to respond to the stories to which they felt a connection, adding anecdotes of their own.

In preparation for the virtual class session, the instructor created a visual presentation of the stories selected for the week. He used the PowerPoint slides created by students about their own stories and added slides that had students' written responses to stories. To do this, the instructor read through all of the threaded discussion comments and selected ones that would lead to more in-depth dialogue and discussion about the stories being presented. He created additional slides by cutting and pasting written text from the threaded discussion and adding students' words to the weekly presentation. The weekly presentation represented many voices and perspectives of the students in the class.

During the virtual class session, each story was allotted 15 min of class time. Recognizing that students had already read the story as posted online, the instructor began by reviewing the associated PowerPoint slides and stating his rationale for selecting the story for class time. The author of the story was asked to retell or otherwise elaborate on the story using the audio feature of Blackboard Collaborate. All students were invited to participate and comment. (All students were expected to have computers equipped with microphones.) Students were welcome to question, comment or affirm. Students were expected to initiate at least two comments during the session. The instructor also participated, bridging the story to concepts from the textbook, when possible, but not lecturing during the session.

The stories were real, current, and embedded in the learning community. They evoked tears, laughter and words of encouragement. During the subsequent week, students were asked to post a written reflection on the session to provide some closure to the discussion. In the course evaluation, there was broad consensus that the storytelling strategy was both engaging and memorable. It contributed to community building, empathy, honesty, sincerity and a "safe" classroom culture, especially when the stories emerged from within the group. It supported beginning teachers who may have felt lonely and isolated. It allowed for discussion of ethical, cultural, and local considerations that are often missed in textbook case studies. It permitted full participation because everyone was able to relate to the stories on some level. The story-sharing strategy modeled a method of instructional delivery that teachers can use with their own students both to teach academics and to help young people understand their own behavior. As one participant stated, "When someone tells you a story, they are reaching out to you in a much more personable way than a lecture ever could. They are sharing a part of their life with you, which in turn makes you feel connected."

CONCLUSIONS AND RECOMMENDATIONS

A key facet for virtual classes is the deliberate use of synchronous meetings to engage in activities that the students cannot do asynchronously. As instructors, we do not use virtual sessions to lecture or teach content in a didactic manner. Instead, we strive to use the time when students are together synchronously to engage them in activities with their peers. We act as guides, planning prior to the session what students will do during the synchronous sessions, but allowing them the space to explore and develop concepts with each other. We remain aware of the diverse settings, cultures, and communities our students are from and attempt to provide prompts, discussion questions, and activities that allow students to share information from their own background knowledge and experiences.

Challenges with scheduling and technology inevitably arise when trying to incorporate weekly synchronous sessions into an online course. Sometimes it is difficult to get consensus on when students can come together online for weekly sessions. We have held sessions later in the evenings and even on Saturdays to accommodate busy student schedules. There also are technological glitches of low bandwidth, audio failures, and other technical issues that arise. Blackboard Collaborate has a feature that allows sessions to be recorded. We record and post the web link for each virtual class so that students who miss a session or have technology problems can watch the recordings at any time after the session. We also encourage students to meet together if they live on the same island or in the same community; working together and with the support of peers, some students who are anxious about technology gain confidence in their ability to participate in the online course.

As stated in the introduction, our use of synchronous web conferencing tools provides us with the means to create active learning communities and to integrate real time discussions about the local and cultural contexts of our students. As illustrated by the three course examples provided, it takes purposeful planning and time to design and incorporate strategies within the virtual class environment. The rich connections and dialogues that result are well worth the time and effort of planning and implementing these strategies that foster the sharing of ideas and allow a plurality of voices to be heard.

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Chapter 6

USING DESKTOP CONFERENCING IN PREPARING DOCTORAL LEVEL SPECIAL EDUCATION SCHOOL LEADERS AT THE UNIVERSITY OF CENTRAL FLORIDA

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PROGRAM DESCRIPTION

As a university professor who supervised student interns from the mid-1990s until the year 2000, I was struck, during my visits to many rural schools, by the lack of knowledge and skills in special education that school leaders possessed. In addition, while visiting rural schools in West Virginia and Louisiana, I also was struck by the lack of opportunity for the school leaders to obtain new knowledge and skills that would help them to better serve children with disabilities and their families. Now, working at a university in a large urban area, I was surprised to find the same issues existed. I believed there had to be a way to close this observed gap between lack of knowledge and practice. In 2003, I proposed a project of National Significance to the US Department of Education, Office of Special Education Programs seeking funding to prepare school leaders across the country with knowledge of special education and skills in best practice program implementation that would allow these leaders to best serve children with disabilities and their families. I proposed the use of distance technology as a key component of the project. Much to my dismay, the proposal was not funded, but the idea remained with me as I watched the need for highly qualified school leaders to work with students who have disabilities increase.

The idea of preparing special-education school leaders to serve all children had been a hot topic in many of the reports to Congress that discussed the need of personnel to serve students with disabilities, but the thought of preparing school leaders through the Office of Special Education Program funding had yet to enter the literature. Preparing students across state lines produces many pedagogical as well as administrative issues. Tuition issues, ownership by university, and student credit hours are but a few. The situation with regard to special education leaders in school systems is equally problematic. Smith and her colleagues (2011) told us that a tremendous shortage of special education leadership personnel currently exists. In their view, these shortages cannot be met with existing traditional post graduate studies programs; the shortage will continue to increase, and the supply/demand will continue to worsen. Potential candidates are often unable to move to attend traditional programs of study; they cannot afford to leave their current positions; they are older than leadership personnel in the past; and they need a more flexible and focused program of study to increase the knowledge and skills they need to better serve the teachers and students in their care.

In 2005, I again applied to the US Department of Education, Office of Special Education Programs for a leadership preparation grant. I was funded to begin the National Urban Special Education Leadership Initiative that year. This funded initiative was designed to address the critical gaps between the traditional preparation of urban special education mid-level administrators and the skills, knowledge, and dispositions needed for full implementation of the Individuals with Disabilities Education Improvement Act (IDEIA) of 2004. The effort provided leadership development, mentoring, and focused networking opportunities for mid-level special education leaders in urban school districts. The integrated curricula and practicum experiences included cross-cutting work on the substantive content and strategies of high quality special education programs in urban settings as well as on related legal, fiscal, assessment, and management-organizational issues. Particular attention was paid to effective collaboration between special and general educators and to collaboration between educators and family, community, and service agency representatives. In addition, the program was offered as an educational doctorate with some of the coursework being offered through distance education technology means.

With the funding of the project, a new conversation had begun and led to discussions on how we might consider using different technologies to deliver course content, host meetings, conduct dissertation proposal defense meetings, and, possibly, even host dissertation defenses. Seeing as it was 2005, we were concerned that some of the web capabilities and software technologies lacked sufficiency to support our ideas. While our university had interactive television capabilities, that type of technology was being phased out. Colleagues and I continued to think, "How would one use the available technology to provide a doctoral level leadership preparation program that could serve school leaders in two separate areas of the state? Do we want doctoral level preparation to be provided as online coursework? Will school leaders be able to obtain necessary leave time to attend doctoral preparation on a part-time basis? Or is there a way to provide the preparation that would use both face-to-face meetings and online coursework?"

Since 2005, NUSELI has been funded three times, and we continue to make changes and improvements in the way we use technology with our doctoral students. Advising, mentoring, and teaching our students continue to be the central focus of our program as we prepare our doctoral students to become our next generation of special education leaders and administrators. With that, we have continued to change and improve the ways in which we use technology across those three contexts.

CONTEXT

Unfortunately, many viewed university programs to prepare school administrators as "adequate to poor" (Archer, 2005), and much improvement was needed. A recent national survey of students in 78 special education doctoral programs indicated concern about the structure, time requirements, and adequacy of research-based knowledge in their programs (Wasburn-Moses, 2008). Moreover, traditional post-graduate leadership programs are often ill-suited for increasing the supply or quality of special education administrators because potential candidates cannot afford to leave their current positions and are more demanding of a flexible and practically focused program to meet their recognized needs in serving more diverse students (Smith, Tyler, Pion, Sindelar, & Rosenberg, 2001).

"A shortage of any type of leader can seriously hamper the field's infrastructure and hinder improved results for students with disabilities." (Smith, Robb, West & Tyler, 2010, p.26). As Smith and her colleagues emphasized, special education leadership preparation ultimately makes a difference in the services received by students with disabilities. Crockett (2007) contended that the landscape of school leadership has changed due in part to recent mandates contained in the No Child Left Behind Act of 2001 and the Individuals with Disabilities Improvement Act of 2004. "Special education administrators play a critical role in the implementation of successful inclusion in diverse, standards-based environments. They provide the vision and leadership necessary to guide educators in both general and special education as they deliver instructional programs to meet the needs of diverse students with disabilities" (Voltz & Collins, 2010, p. 70). This quote addresses the critical need for highly qualified doctoral level urban school district special education administrators who possess both the research-validated knowledge and skills and the practical wisdom to develop, implement, and evaluate exemplary programs, practices, and services for students with disabilities. Yet, the issue remains in institutes of higher education – how do we delivery the programs of study necessary to provide these school leaders the high quality instruction needed for them to effectively and efficiently serve student with disabilities and their families?

The unique needs and talents of students with disabilities are difficult to assess appropriately and address adequately. IDEIA mandates that students with disabilities receive their education with non-disabled students to the maximum extent possible. Nearly two-thirds of the over 5.6 million 3-21 year old children and youth identified as exceptional in the United States are being taught either full-time (41%) or part-time (24%) in general education classes (U.S. Department of Education, 2000). Schools are more likely to have position vacancies in special education and to have fewer fully-certified teachers in this area. The daunting challenge facing special education leaders in schools is to do more for more diverse students with less and less qualified personnel and very restricted resources. As the Annual Report to Congress (2014) stated, "In many regards, the transition from secondary school to postsecondary roles appears more difficult for youth with disabilities in urban areas compared to youth in suburban and rural areas" (p. 13). The number of students with disabilities served under IDEA continues to increase at a rate higher than both the general population and school enrollment.

The situation at the local education association (LEA) level is equally unsettling. Practicing special education administrators (Wigle & Wilcox, 2002), as well as the teachers with whom they work (Goldstein, 2004), have indicated that they do not feel they have the competencies necessary to do their jobs in line with state and professional standards. Special education curricula are often poorly aligned with state standards (Kurz, Elliott, Wehby, & Smithson, 2009). In the Urban Special Education Leadership Collaborative (USELC) national study, about one-third of the special education leader-respondents said that their districts did not have anyone else interested in and/or capable of providing leadership should the respondents leave their positions. While most respondents indicated that their districts provided leadership training, they indicated that this training was mainly for principals in general with little focus on other roles, special education, or integration of special education with general education. When asked what competencies were critical to the success of special education leaders, the most frequent responses were knowledge of special education law and regulations; ability to collaborate with general education colleagues, parents and community agencies; resource allocation and management; developing and realizing a shared vision of special education program development and service delivery within the special education and general education interface; crisis resolution; and organizational change (Riley, 2006). The disparity was clear between what was judged desirable in terms of essential special education leaders' knowledge, skills, and dispositions and what was being provided in the way of professional development and support.

TECHNOLOGY FORMAT

The principle of universal design for learning (UDL) is the guiding instructional principle in all our programs. As we know from the amended Higher Education Act of 1965, accessibility reduces the barriers found in instruction. "UDL is a framework for designing curricula that enable all individuals to gain knowledge, skills, and enthusiasm for learning. UDL provides rich supports for learning and reduces barriers to the curriculum while maintaining high achievement standards for all" (http://www.cast.org/). That being said, opportunities, as well as obstacles, existed in implementing best technological practices into the project. Using new and different technologies is always easier if a person is a computer user and has some basic technological experience.

While many university faculty have been forced to learn to teach online, many school leaders have not. In order to be successful with online teaching, faculty members and those receiving the instruction need to have technological support, as well as time to devote to the task. One of the disadvantages of teaching online - in my experience at a large university - has been that policies and procedures do not always provide the necessary support to be successful in online teaching. The issue appears to be one of organizational structures where one specific office provides the online course assistance and one specific office provides the technological assistance - and never the two shall meet. Yet, as a professor with a strong doctoral program, I have the distinct advantage of working with a cohort of doctoral students who came to our program as digital natives. The assistance they provide me on a daily basis allows me to increase my knowledge base concerning current technology practices, as well as provides me the skills needed to be successful in using desktop video conferencing as a technique to teach my doctoral seminars.

In addition, the reader needs to keep in mind that the initial project was conceived in 2004. It was submitted for funding that year and was not funded. The project was then reconceived as a doctoral leadership preparation program and submitted to the US Department of Education, Office of Special Education Programs. The project then was funded. The obstacle presented due to the fact that the project was funded 5 years ago was that much of the technology that exists today did not exist at that point in time. In looking at some of the literature, I find that I must agree with McBride, Fuller, and Gillan (2001), who were discussing desktop video conferencing and stated, "It has been hailed as a dynamic new technology that operates in a synchronous environment and provides a high degree of interaction between students and their instructors" (p.2). The reader needs to remember that distance learning at that time was encompassing many different forms of course delivery, including the use of digital video communication (DVC). DVC was a somewhat new concept in 2001. McRail and Rozema (2005) stated "… university doctoral programs in English education face a complex task. They are being called upon to prepare scholars who will contribute meaningfully to the latest corpus of research and also to prepare teacher educators who will be conversant in both traditional academic areas, as well as the cutting edge of the latest technology-enhanced (and frequently media-based) pedagogical and communicative tools. How should doctoral programs prepare students for such complex leadership role?" (p. 1).

Numerous ways were used to present the content of the program. Some of the doctoral courses were offered face-to-face, some were offered partially online, some were offered totally online, some were offered as Weekend College on Friday night and Saturday, and some were offered via desktop video conferencing technology. As I reflect upon one of the first courses offered in the program, I realized that, while I had worked for over 6 months with the professor who taught the course, I obviously had not worked long enough, hard enough, or smart enough to have her understand how the technology would be used in the course she was teaching that the NUSELI students were required to take. On the evening of the first class for this course, two technology doctoral students, one technology staff member, and I went to the classroom to set up Skype as a way for the students in the Miami-Dade area to receive the course content from the University of Central Florida Orlando campus. I explained that the headphones and a microphone would need to be worn in order for the students to hear the lecture. The response was "Oh I could not possibly do that." Needless to say, we were all quite surprised and decided we had best provide an alternative method of delivering the course content other than the face-to-face option from the professor. I called the students on my cell phone and told them that three members of their cohort who were in the face-to-face class would relay the information via their computers. The individuals from the project cohort proceeded to provide all the information that was necessary in order for the people in Miami to be a part of the course. One student corresponded with the students in Miami through a chat function while one student guided the Miami students to the PowerPoint presentation that the professor had uploaded, and a third student stayed on a muted cell phone to pose questions to the professor if the Miami students had them. The next day, I was informed that the professor had opened an on-line version of the course so the issue was solved.

While that experience was not the most pleasant I have had, I will say that I learned quite a bit from having it. What I learned was that I need to work very closely with the entire faculty who are teaching courses in the educational doctoral program. I learned that I need to be very organized and very well-versed in the use of the technology that would be delivering content to doctoral students who were at a distance. I had reviewed different web delivery options, but most had a cost requirement that the grant could not cover. So, the decision was made to use Skype as our desktop delivery. We finally decided to use Skype, a voice over Internet protocol (VoIP). Skype is a software application that lets users make voice calls over the Internet and has a video component. It allows for free video calling which made it easier to contact the students who were at a distance. We were looking at Skype for its new technology of video.

While we used Skype on numerous occasions in the past 4 years to connect to our students who were at a distance, it was not without incident. As in the story above about the first class taught, we were attempting to use Skype that evening when we had difficulty connecting with the people in Miami. The difficulties can arise on both sides, meaning Miami could see us in Orlando and we could see Miami students from our Orlando computer, but nobody could hear what was being said. We have since had many backup plans when using Skype for seminars or meetings. We always have additional computers and cell phones in case the computer we are using is not connecting to the computer we are calling. In addition, we make sure that we have e-mailed or posted online all of the content which we will be discussing during the Skype call.

As technologies continue to grow and change, we have added the use of several free Google Applications (Apps), including Google Hangout, Google Calendar, Google Documents, and Google Drive. These Google Apps are free and accessible in that anyone with a Google account can easily login to access. The first program, Google Hangout, allows users to communicate live via instant messaging and video chat features. Google Hangout works best for small groups of up to 10 students. Video features enhance the conversation as all members of the Hangout can utilize their video and speak in real time. Additional features include a Screenshare option, which allows Google Hangout participants to view their desktops so that real time collaboration can occur on a document. Google Hangout allows for faculty to meet with students 1:1 or in small groups. In addition, students themselves can create their own Google Hangout time which can facilitate group projects. Google Hangout is a great way to keep the lines of communication open as students have questions regarding classes or the dissertation process.

As doctoral candidates approach their last year in the NUSELI program, much of their progress towards dissertation relies on keeping themselves on a calendar, as well as providing updates to their dissertation chair. Google Apps assisted with both of those tasks. Google Calendar can be used on a computer, phone, or tablet. Any events that you add to the calendar will sync with all of the versions of Google Calendar as you update and create events (Google Support, 2015). Another critical feature to Google Calendar is that you can share your calendar with others and they can view those events. In terms of NUSELI, Google Calendar allowed students to keep themselves on track in order to meet University deadlines, as well as personal and professional deadlines, as they journeyed toward a completed dissertation. As Dr. Martin was the dissertation chair for numerous NUSELI students, it was imperative that she completed her own calendar via Outlook or a Google Calendar in order to manage and support the NUSELI scholars.

In addition, as cohorts moved toward the program at varying pace, the use of Google Documents assisted in ensuring that each doctoral candidate was progressing toward the completion of his or her study. As the program coordinator, I was able to create a Google Document that recorded each NUSELI scholar's progress towards University paperwork, as well as dissertation progress. That way each scholar continued to be held accountable

Table 1
Desktop Technologies: Critical to Collaboration

Technology	Purpose	Resource
Google Hangout	Video and Instant Messaging feature. Works best for small groups. Live collaboration using Screenshare.	http://www.google.com/+/learnmore/hangouts/
Google Calendar	Update and share events and timelines for dissertation and other projects.	www.google.com/calendar
Google Documents	Upload and collaborate on group documents. Updated in "real time." Keep records of dissertation and project progress.	www.google.com/docs/about
Google Drive	Get access to files and storage. Send files and ensure all are working on same document	www.google.com/drive
Dropbox	Cloud storage. Send and share files.	www.dropbox.com

for paperwork and their own individual academic progress. Moving forward, NUSELI scholars could independently utilize Google Documents in order to provide their chair weekly updates on the dissertation. Updates occur in real time and more than one collaborator can make changes to the document. In turn, their dissertation chair could easily access the documents and view progress that was made on a routine basis. Further, NUSELI provided editors for each scholar for the final stages of the dissertation process. Google Documents assisted in coordinating each editor, as well as stage in the editing process, so that the coordinator and project director could have access to see periodic updates.

Throughout the doctoral program, faculty and scholars may collaborate on projects within their coursework as well as during the dissertation process. Google Drive offers free "cloud" storage (up to 15GB) for any files that are uploaded. This way, collaborators can access the documents as well as can make sure they are working on the same versions of a particular document. Besides Google Drive, Dropbox is another option that offers free storage (up to 2 GB) for documents.

APPLICATIONS FOR TEACHING AND LEARNING

As early as 1996, obstacles were being presented in the literature about the use of Desktop Video Conferencing (DVC) for course delivery. Googin, Finkenberg, and Morrow (1997) discussed issues with bandwidth, video clarity and audio clarity. How does one send and receive such large amounts of information when the technology cannot support the need? We also have the obstacle of having faculty who are well prepared to use different forms of technology to deliver course content. Ian Quillen reported in the September 22, 2010, issue of *Education Week* that, many times, colleges of education simply choose the youngest faculty member as the most qualified to teach our distance education courses. "So, while online education advocates grown at a recent survey by the technology company Blackboard Inc. found that only 4% of responding teachers have been taught how to deliver online courses during free service education, changing that percentage may not be a top priority" (Quillen, 2010, p. S11).

Other obstacles to using distance technology, articulated when delivering doctoral level preparation, center on changing the culture of the college and university where you teach. While at a national conference, I had the opportunity to discuss with some urban special-education leaders the idea of the need for highly qualified school leaders to work with students with disabilities and their families. While tossing around many ideas, the use of desktop conferencing in preparing doctoral level special education school leaders was an idea that rose to the top of the discussion. Yet, upon returning from the conference, I was met with comments, such as "That can't be done" and "We are not an online doctoral institution."

Opportunities existed as well as obstacles. Through the use of some of the technology mentioned above, the University of Central Florida Exceptional Education Program has been able to prepare 17 school leaders to receive their educational doctorates and, thereby, better serve children with disabilities and their families. Currently, nine students are completing their dissertations. In addition, during this time, many faculty members have learned to use new technologies and have begun incorporating them into their coursework.

Through the use of Skype, we have been able to host three dissertation proposal defenses. Through the use of Skype, we have been able to host research seminars from my office while being received in the homes of the students. Through the use of Google hangouts and Adobe Connect, we have been able to work with students and graduates as they prepare their dissertations for publication. Having a cohort of flexible school leaders as students has been a tremendous benefit to the program. These individuals were adaptable, strong problem solvers and very well-versed in the need for flexibility.

CONCLUSIONS AND RECOMMENDATIONS

In conclusion, I will continue to use Skype and other desktop videoconferencing technologies to deliver instructional preparation to students who cannot attend some of the face-to-face classes. Since the National Urban Special Education Leadership Initiative has been refunded and will continue to serve three of the largest school districts in the country, we will use as many technologies as available to ensure the delivery of knowledge and skills to urban school leaders in order to best serve students with disabilities and their families.

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Chapter 7

KEEPING IT REAL: WEBCAM SUPERVISION OF PRACTICING SPECIAL EDUCATION TEACHERS AT CALIFORNIA STATE UNIVERSITY, CHICO, USING SKYPE™ AND OFF THE SHELF WEBCAMS

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California State University, Chico

PROGRAM DESCRIPTION

If one can imagine a service area the size of Ohio assigned to an educational institution, then one has a sense of the scale of the region in which California State University, Chico (CSUC) supervises practicing teachers. If you add in mountain peaks rising to 7,500 feet that can become impassable in winter, one has the formula for the isolation and difficult travel that Collins and Schuster (2001) described as some of the challenges to rural special education. Due to these hurdles, Bullock, Gable, and Mohr (2008) have correctly noted that preparation programs in rural settings have been particularly eager to adopt technology-mediated instruction.

Distance factors, along with increased caseloads and decreased budgets, were the original impetus to use technology to enhance supervision of special education teachers in our program. At the same time, we did not want these challenges to be an excuse for decreased quality. With these issues in mind, we developed the "keeping it REAL" (Koch, 2010) acronym to describe our goals in using technology; we sought to develop a format that was **R**ealistic, **E**ffective, **A**ccessible, and **L**ow cost. These four principles undergird the process that we developed.

CONTEXT

California State University, Chico is the second-oldest campus in the California State University system. It is located in Chico, CA, about 90 miles north of the state capitol of Sacramento. The alternative special education teacher preparation program housed at this campus serves a region that covers 38,000 square miles of rural northeastern California terrain and is the sole state university in the region preparing special education teachers. As an alternative credential program, it provides candidates with the opportunity to be the teacher of record in rural schools while simultaneously earning their preliminary special education credential. Candidates without a multiple or single subject teaching credential typically complete the program in 2 years.

Issues of poverty in the region accompany traditional rural challenges of distance, isolation, and lack of resources. Problems of access—long distances, difficult topography, and severe weather—often hinder rural recruitment and training efforts (Sebastian, Calmes, & Mayhew, 1997). This is especially true of our northeastern California region. Prospective teacher candidates may live more than 100 miles from the university campus. To complicate matters, severe winter storms in the Trinity Alps, southern Cascades, and northern Sierra Nevada mountain ranges can effectively prevent interns from attending teacher preparation classes and provide challenges to the university's commitment to regular and consistent university supervision and mentorship.

This alternative special education program is committed to "growing its own" special education teachers in order to find and retain teachers who will provide a long-term commitment to teaching in these remote rural communities. Because of this, prospective candidates are most often recruited from the same rural high-poverty demographics that characterize the region. Many teacher candidates are career changers or people who are re-entering the work force. Candidates' average age is 34, and many have limited comfort and experience with technology. Often adding to their initial discomfort with technology is the inconsistent and unreliable access that many rural communities have to the Internet.

The candidate's support team consists of CSUC-based program coordinators, supervisors and local mentors and administrators. Supervisors are often university instructors who facilitate teacher candidate support in their assigned region. Traditionally, supervisors observe candidates three to four times on-site during a semester and communicate and develop rapport with the candidates and their school administrators. During these observations, candidates are responsible for the development and implementation of lesson plans that address the state standards, their students' IEP goals/objectives, and reflection on their teaching practice. Supervisors provide prompt feedback on the observed lessons and levels of teaching competencies. Supervisors, candidates, and administrators collaborate on the development of the candidate's Individual Induction Plan (IIP). The IIP is a pivotal program document that provides a clear focus for the candidate's professional growth goals and a means of assessing the resources needed to obtain these goals and a timeline for when the goals will be assessed. This document is re-assessed at the end of each semester.

Several major challenges associated with serving rural teacher candidates have negatively affected the consistency and frequency of supervision visits. Hazardous roads and poor weather often result in rescheduled and delayed opportunities for candidate support and feedback. Unpredictable changes in scheduling due to candidate illness or family emergencies often can result in weeks of trying to reschedule supervision visits that may clock over 4 hrs of driving time. This lack of consistency and efficient use of time has been a concern of program faculty since the program's inception over 20 years ago.

With the emergence of accessible, affordable technology, the special education program began to investigate options that would provide supervisors and candidates with an effective means for supplementing on-site supervision. After a pilot study that involved the use of Skype™ and webcams, faculty began to investigate the benefits of using web-cam technology with candidates who were the most impacted by living and working in rural and isolated settings. On-site supervision observations were supplemented with one to two web-cam supervision observations. Keeping focused on providing a balance between accessibility and high quality supervision experiences, supervision requirements and expectations for well-prepared lesson plans were maintained.

TECHNOLOGY FORMATS

The choice of technology has been driven by our "keeping it REAL" (Koch, 2010) philosophy of a realistic, effective, accessible, and low-cost format. It has been our experience that keeping the technology expectations realistic can reduce initial resistance by teachers and increase their success. To this end, we simplified the technology to four essential components: (a) a reasonably up-to-date computer, (b) an Internet connection, (c) an effective web camera that includes a high-quality microphone, and (d) software that will securely transmit audio and video images that are accessible to the supervisor. If a teacher has the computer and the Internet connection, the total monetary cost can be in the range of $39.99, which meets our low-cost criterion.

Computer

There are operating system requirements that need to be followed in order for the computer to pair with an external web camera. For the Blue Microphone Eyeball 2.0 (the webcam that we chose), the system requirements for the Mac are an OS 10.4.11 or higher. For a PC, the requirements are Windows XP/SP2, Vista, or Windows 7. In our experience, these requirements have not been difficult to meet when using the variety of computers found in our teachers' classrooms.

Internet Connection

According to Skype's website user guide (Skype, 2010), the recommended speed is 500 Kbps (Kilobits per second). However, the user guide also states that the minimum speed to transmit by Skype is 33.6 Kbps, which can be achieved with a dial-up modem. If using a dial-up modem, the user must be sure to close other applications that could otherwise slow down the performance. In some cases, a local educational agency (LEA) may have a firewall or blocking software limiting access to the Internet. The teacher may need to contact the appropriate information technology person or department to gain access to a proprietary website, such as Skype.

Webcam with Microphone

We selected the Blue Microphone Eyeball 2.0 HD Audio and Video Webcam due to its ease of installation, excellent audio capabilities, and low cost. The Eyeball works with both Mac and PC operating systems and requires no installation of software. It is also designed to attach to and work with both laptop and desktop computers. We place a premium on excellent sound quality in supervision, and this model serves us well. The price through an online retailer was $39.99 per webcam, which we purchased and loaned to our teachers for the duration of their supervision. In our case, about half of the teachers needed to borrow a webcam; the other half already had a webcam installed. For further technical information, the Blue website can be visited at http://www.bluemic.com/

Rock et al. (2009) employed Bluetooth® technology to allow teacher candidates to send and receive audio transmissions through an earpiece. There are benefits to this hardware, such as better sound reception when the teacher ranges farther from the computer and the ability to receive immediate feedback from the supervisor without distracting the students. The main drawback is that the earphone has been the most likely place for technology glitches. In one case, the Bluetooth would not pair with or communicate with the computer, but it would pair with the teacher's cell phone. We used the cell phone as the transmitter of the Bluetooth signal, but this reduced the security to the level of a cell phone. The encryption provided by Skype is diminished when the audio is transmitted via a cell phone. Our decision was to make the use of the Bluetooth optional for those teachers who could make it work securely. We used the webcam microphone for the majority of teachers.

Software to Transmit the Webcam Output

We chose Skype because it is free, easy to use, and secure. Additionally, Rock et al. (2009) found that Skype was effective across numerous supervision settings. To facilitate setting up Skype, the lead author wrote "The Technophobe's Coach for Setting Up a Web Cam and Skype" (Koch, 2010), which is available on our department website (see List of Resources). This guide has instructions for both PC and Mac computers. Both supervisors and teachers have successfully completed the webcam and Skype set-up by using this tool as their source of technical support. For further technical information about Skype, their website can be visited at http://www.skype.com/intl/en-us/home

APPLICATIONS OR TEACHING AND LEARNING

What Do Learners Have to Prepare for and Learn to Use the Technology?

It is essential that each instructor be reasonably fluent in the set up and use of Skype and the webcam with both Mac and PC computers. Our department had a "Skype party" in which faculty who were newcomers to Skype and the webcam could set them up while using the protocol that was developed (Koch, 2010). This training experience allows the instructor to exude confidence that people with a diverse range of technology skills can make the technology work. It also prepares the instructor to coach the learners in the same skills and to anticipate the typical problems that will arise.

It is also important for the instructor to remain sensitive to the anxiety that any new technology can create for a teacher. This is especially true when the technology is used as a medium for formative and summative evaluation of that teacher. A trial run of the equipment—in which the learner/teacher and instructor/interventionist use Skype to discuss the upcoming observation—can desensitize the teacher to the process. This trial run can be as brief as 10 min. It provides an opportunity to discuss the upcoming lesson to be observed and the best positioning of the webcam to best capture the sound and video. A second Skype meeting, in which the instructor observes part or all of a lesson but does not formally evaluate the teacher, can further reduce whatever concerns might remain.

We have found that any new technology, especially when it involves cameras, can raise concerns with parents and administrators. With this in mind, a letter to parents was developed (see Figure 1) to describe the rationale for the webcam, the safeguards that are in place to protect privacy, and the potential educational benefits to the child. If a parent objects to having his or her child viewed on the webcam, the letter has a form that permits the parent to opt out the child from this form of observation. While parent requests to opt out have been rare, it is vital that the teacher inform the parents in advance with a letter that covers their typical concerns. The site administrator also needs to be given a copy of the letter in advance of any actual use of the webcam in the classroom. This can head off misunderstanding that could stall the implementation of the webcam supervision.

The teachers need to set up their webcams and Skype well in advance of the first coaching or formal observation. It is advisable to give teachers a specific date and time that you will be calling them on Skype. This means that the teachers need to download the software and register with Skype so that they can obtain and exchange "Skype names" with their supervisor. The Skype name is a unique identifier, like a phone number, that allows the caller to be certain that the call is going to the intended person. At the appointed

Figure 1. Parent consent form

California State University, Chico
College of Communication and Education
Department of Professional Studies in Education
Campus Zip 460

Dear Parent/Guardian,

This letter is to provide you with information about an assignment that your child's teacher will be completing in the classroom. As a special education teacher who is taking classes at California State University, Chico (CSU, Chico) your child's teacher is learning the most effective ways to help your child learn and succeed at school. Part of that learning includes supervision from an experienced CSU, Chico supervisor. For a number of years, that supervision has included live visits to the classroom and reviewing videotapes of instruction that the teacher turns in to the supervisor.

This year we are pleased to add supervision with the use of the web camera. This will be used for some, but not all of the supervision visits. Web cameras are being used increasingly to improve services in education and medicine, especially in more rural locations where services may be limited. U.C. Davis, for instance, provides web camera coaching to parents who have children with autism. It will be one more tool to allow us to provide the teacher and your child with the best possible learning experience.

When your child's teacher is supervised with a web camera, we will connect the camera to a class computer and use Skype™ (a program that is like a telephone with a TV picture) to allow the university supervisor to observe the teaching from their university office. We realize that this process may be new to some parents, so we want you to be assured of the safeguards used to protect the privacy of your child, as well as the benefits to your child.

Safeguards to your child's privacy

- Skype uses international standards of Internet security. It is more secure than communicating with a cell phone.
- The supervisor can only observe the class when your child's teacher has directly dialed the university supervisor for a scheduled observation.
- No recording is ever made of the web camera observation; the teacher's university supervisors view it, as the instruction is occurring, as they would an in-person observation.
- The teacher's university supervisor is observing the instruction on a computer in a private office. Only authorized supervisors may observe the instruction.

Benefits to your child:

- It is possible to offer more frequent supervision to your child's teacher because of reduced driving time.
- With less travel time, observations can be scheduled on shorter notice, which allows us to respond to specific teacher questions about instruction or behavior management.

- Teachers who have used this form of observation say there is less disruption in the classroom than having an outside observer come into the classroom.

- Studies indicate that teachers increase their effectiveness when given immediate feedback from a supervisor.

If you agree to have your child's teacher observed with the web camera approximately one to three times per semester, then no further action is necessary. If you do not want your child to be visible during the use of the web camera, then please sign and return the form below to your child's teacher. If you wish further information, or have questions, please contact Dr. Steven Koch at CSU, Chico at 530 898-4850. Thank you for taking the time to review this letter.

c.c.: Site Administrator/Program Supervisor

If you <u>do</u> agree to have your child visible during the web camera observation, then no further action is necessary. If you <u>do not</u> want your child to be visible during the use of the web camera, then complete the form below and give it to your child's teacher. Thank you.

____

Please print the name of your child

____

Signature of Parent or Legal Guardian Date

____

Print name of Parent or Legal Guardian

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time, either the instructor or the teacher will call the other and make certain that the audio and visual transmissions are working in both directions. The most common difficulty is that either the sound or the camera is not "enabled" in the necessary places on the computer settings. Both our department protocol (Koch, 2010) and the Skype website contain troubleshooting tips. If there is a problem with LEA firewalls or Internet access, this is the time to address those issues with the technical support personnel of one's LEA.

We encourage up to three brief (approximately 5 min in duration) test runs of the webcam. The first can be conducted with only the teacher to ensure that everything is functioning. Once it is certain that the Skype audio and video are operational, invite the administrator and any concerned parent to attend a trial
run of the webcam. It is recommended that this occur without students present so that full attention can be given to the questions of parents and the administrator. Most people are fascinated by the webcam's potential and will become supportive of its use.

Students will tend to be either intrigued, slightly self-conscious, or nonchalant about the use of webcams. It suggested that students be exposed to the webcams prior to an actual observation. This allows them to comment, ask questions and become accustomed to its presence in the classroom. We also recommend leaving webcams in place, even when not operating, so that students become further desensitized to their presence.

Steps to conducting a typical webcam supervision of practicing teachers. The number of supervision visits is determined by the practicing teacher's semester in the program. Teachers in Semesters One and Three receive 3-4 supervision visits. At Semester Two, they typically receive 1-2 supervision observations. The instructor and teacher decide how many of the observations will be respectively conducted via webcam or face-to-face observation. We have developed a "Checklist for Completing a Webcam Supervision" (see Figure 2).

These steps make reference to forms that are available for download on the department website (see List of Resources).

Figure 2. Webcam supervision checklist.

- ❑ Two days before the scheduled webcam supervision, the teacher completes "Lesson Plans: Form A and Form B" and sends them via email to the supervisor. These forms describe the lesson plan for the teaching event that will be observed.
- ❑ If needed, the supervisor will make comments and send them to the teacher for possible modification of the lesson by the teacher.
- ❑ On the scheduled observation date, the supervisor will call the teacher using the Skype call button, as described in the "Set-up Guide". The supervisor will call about fifteen minutes before the start of the lesson. This allows the resolution of last-minute sound and video glitches. The teacher makes certain that any students whose parents do not want their child observed by the webcam are moved away from the camera's view. This also permits students a few minutes to acclimate to the virtual presence of the supervisor.
- ❑ Once the lesson begins, the supervisor will often mute their microphone so that extraneous sound does not disturb the lesson. The teacher may also plug in headphones on the classroom computer, which will serve the same function of reducing sound from the instructor's end. The supervisor completes the "Supervisor Comments Form" as well as the "Education Specialist, Level I-Rating Summary Form" for those standards being evaluated.
- ❑ Time is scheduled after the lesson to debrief and conference about the teaching event. We will try to arrange this conference immediately after the teaching session. We recommend that the conference occur when the students are on a break or lunch. This permits increased freedom to mutually discuss the lesson and make laudatory as well as corrective comments. The privacy can be increased if the teacher wears headphones during this exchange. The conference concludes by confirming the date and time of the next supervision observation.
- ❑ Within the next week, the teacher completes "Lesson Plans: Form C and Form D" and emails them to the supervisor. These forms allow the teacher to reflect on the lesson and describe both its strengths and areas for needed growth. The supervisor likewise emails the "Supervisor Comments Form" and the "Education Specialist, Level I-Rating Summary Form" to the teacher.

CONCLUSIONS AND RECOMMENDATIONS

Our faculty has become quite energized about the use of this technology. The notion of keeping the process "REAL" (realistic, effective, accessible, and low-cost) has made webcam supervision relatively straightforward to supervisors and teachers alike. It has been especially important to view webcam supervision as one tool in the toolkit; it is not intended to supplant face-to-face or video recordings. For a teacher who receives four observations, webcam supervision can be employed for none, all, or some of the visits. One supervisor uses it for every visit with the more remote students; another requires at least one webcam observation each semester per teacher, regardless of distance. The location and unique needs of the teacher will determine the mix of observation modalities used.

Due to decreased driving time, webcam supervision has enabled us to provide more frequent supervision to some teachers. The reduced travel time also means that we can respond more spontaneously to teacher requests for observation of students with unique instructional or behavior needs. It can be disheartening for a teacher to wait several weeks to get guidance on how to work with a particular student, only to discover that the particular student is absent on the day the supervisor is scheduled to observe. With the webcam, the supervisor can give days and times that he or she is available, and the teacher has the option to call and ask for observation and consultation when a specific difficulty is actually occurring. Teachers were generally eager to participate in an innovative practice. Even logistical and technical problems became opportunities for collaboration as interns, university supervisors, and district personnel sought to address these issues.

Many of our teachers reported that they prefer webcam observations because there is less disruption in the classroom than having an outside observer come into the classroom. In fact, most students adapted quickly to the web camera and laptop on the desk, allowing for more candid student behavioral and curricular responses in the classroom. In one instance, a fourth grader on camera could be heard doing a "think-aloud" (i.e., sub-vocalizing a strategy for completing an academic task) as he was attempting to complete a multi-step general education assignment. This close observation of individual students is not generally feasible during conventional site visits. If the webcam is left in place at all times, there is little or no transition time expended when starting an observation.

Limitations

We discovered a range of Internet speeds in rural school settings. LEA firewalls and blocked Internet access also added to the challenges. These issues need to be handled by the teacher's district or LEA and are beyond the scope of the supervising agency. However, the supervising agency needs enough technical skill to surmount the routine set-up glitches that occur with varied computers and a diverse range of skill levels of the teachers being supervised.

In addition, students' work was difficult or impossible to see at times due to the angle of the camera. The static camera could not show multiple stations/activities going on within the lesson. Faculty are currently working with field-supervised teachers to explore various options (e.g., changing angles of the camera during the lesson, setting up a mirror to show student written work) to provide the ways for the university supervisor to see student work and multiple angles in real time during the webcam session.

For differing reasons, teachers, administrators, and parents may be resistant to being supervised with the webcam. Fear of the novel and unknown seems to be the common thread to any lack of willingness to utilize this technology. Teachers taking an alternate route to certification tend to be older than those following the traditional route. As such, they may not be comfortable with emerging technology. Administrators need assurance that we have covered the bases regarding parent permission and student confidentiality. Parents will have privacy concerns, especially if there are child custody issues. Parents also may need to know how this technology will truly benefit their children. The Letter to Parents with a copy to the administrator (see Figure 1) was designed to alleviate some of these concerns.

FUTURE APPLICATIONS

The next application will be the standardized use of Bluetooth headsets to increase the immediacy of the supervisor's positive and corrective comments. Scheeler, Ruhl, and McAfee, (2004) cited evidence that supervisor feedback needs to be given as rapidly as possible. A mobile headset facilitates even more immediacy than a conference at the conclusion of the observed lesson. We also plan to provide detailed options/instructions for positioning of the camera relative to the students and the teacher intern/candidate. We also will continue working with our teachers to explore ways to increase the visibility of greater aspects of the lesson and the classroom.

We suggest that teachers purchase the cameras themselves. In our experience, about half of the teachers will already have a camera that works reasonably well. For those teachers who need cameras, it is more efficient to specify the model and let teachers take care of getting the cameras shipped directly to them. In our attempt to be helpful and reduce barriers, we created a new hurdle by needing to send the hardware across the very distances we were trying to avoid traveling! We also encourage teacher interns to pair verbal instructions and written instructions with assignments whenever possible. Not only is this helpful for webcam observations, but it enriches the lesson for students with a wide range of language and literacy capabilities.

In a rural area with its unique challenges, the benefits of this particular webcam approach clearly outweigh the limitations. While we expect our approach to evolve as we gain experience, our format will continue to include realistic expectations, effective pedagogy, accessible technology, and low-cost solutions to rural special education teacher preparation.

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LIST OF RESOURCES

For forms:
http://www.csuchico.edu/psed/credential/intern-forms.shtml
For Skype guide: http://www.csuchico.edu/psed/

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Chapter 8

E-MENTORING NEW SPECIAL EDUCATORS THROUGH EDUCATIONAL PARTNERSHIPS IN OHIO

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PROGRAM DESCRIPTION

Over the last decades, researchers have documented "new teachers' turbulent landings" into their classrooms" (Kardos & Johnson, 2010, p. 23). Without a system of supports, new special education teachers (SETs) struggle on their own to apply what they learned in their preservice programs and may become discouraged as they try to manage what seems to be insurmountable and often conflicting demands. Providing support to new SETs is often problematic given that there are fewer SETs available to serve as mentors, particularly for those teaching students with lower incidence disabilities (Smith & Israel, 2010) and for those in rural districts.

The kinds of induction programs that make a difference include varied supports, such as a mentor in the teachers' assignment area, opportunities for collaboration with other teachers, and professional development, as well as instructional coaching and feedback (Kardos & Johnson; Smith & Ingersoll, 2004). Providing induction is particularly challenging in rural districts, given the personnel and financial resources needed to provide multiple supports to only a few teachers.

To address the needs of new SETs teaching students with low incidence disabilities and autism in Ohio, an e-mentoring partnership was developed among the University of Cincinnati, the Ohio Center for Autism and Low Incidence, the Regional Autism Advisory Council of Southwest Ohio, and local school districts. Currently, this collaboration is fostering ongoing e-mentoring and coaching and an active research agenda focused on how to (a) support teachers of students with low incidence disabilities, (b) prepare new SETs and their e-mentors to utilize the online tools available through this collaboration, and (c) coordinate with district instructional technology support staff in facilitating teachers' use of e-mentoring technologies.

TECHNOLOGY FORMATS THAT SUPPORT E-MENTORING

To support the induction needs of new SETs in rural school settings, regardless of the local support infrastructures available to them, we chose to integrate a comprehensive system of e-mentoring utilizing Internet-mediated communications. By focusing on online means of reaching these new teachers, we eliminated the need for coaches to be physically present in the new teacher's instructional setting (Rock et al., 2009; Smith & Israel, 2010). E-mentoring, simply put, allows new teachers in rural settings to have access to coaches regardless of geographic location.

We chose to use a combination of synchronous and asynchronous technologies as neither form of e-mentoring support, on its own, fully addresses the unique needs of our teachers. In this chapter, we focus specifically on the synchronous e-mentoring infrastructure as it relates to the broader e-mentoring system. The synchronous e-mentoring supports offered through remote observations and coaching, as well as post-observation conferences, allow for immediate interactions between an e-mentor and new teacher that is focused on immediate instructional feedback.

These synchronous interactions are seen as part of a broader e-mentoring infrastructure as they inform the coaches about the types of asynchronous supports necessary to extend the new special educators' professional practice. Coaches initially observe the new special educator and then collaborate with the new teacher in professional learning goal setting. Once the new teacher and his or her coach have developed clearly articulated goals, the coach and new teacher engage in synergistic synchronous virtual coaching using wireless headsets as virtual bug-in-ear (VBIE) coaching and asynchronous collaboration and professional development.

Several technologies are used within our synchronous e-mentoring efforts. These technologies allow coaches to observe new teachers during their instructional practices, provide them with coaching both during and after instruction, and then collaboratively problem-solve and extend learning within the asynchronous e-mentoring infrastructure.

Web Conferencing. A primary focus of the synchronous aspects of our e-mentoring program is remote observations and coaching through web conferencing technologies. As school districts have different levels of technology supports for web conferencing, we typically use computer video conferencing technologies with webcams and free web conferencing software, such as Skype (www.skype.com) or iChat (www.apple.com), rather than investing in more costly interactive video conferencing (IVC) systems. Although webcams do not have the versatility of the more expensive IVC systems, they can easily be used to conduct observations, especially of small group or individualized instruction.

IPod Touch Web Communications. In schools that have wireless Internet access, we have recently begun to use the new iPod Touch systems as they now contain built-in cameras and the software, *FaceTime*, which allows for video calling. Because the IPod Touch systems do not require connection to a computer with a webcam, they are proving to be more versatile. A teacher can simply place an IPod Touch on a small tripod and directly Skype with the coach. This system is cordless and can be easily moved to different instructional settings within a building without concern for direct connection to a computer.

Regardless of whether traditional webcams or the newer IPod Touch systems are used, both technologies allow the coaches and new special educators to access each other in real time. Additionally, because web conferencing software, such as Skype and iChat, are free, the cost of these communications after the initial investment in technologies is virtually free.

Wireless headsets for virtual bug-in-ear (VBIE) coaching. The same web conferencing technologies described above are used for VBIE coaching (Rock et al., 2009). The focus of VBIE coaching is to provide immediate coaching focused on the jointly agreed-upon goals set by the new special educator and coach. The new teacher wears a wireless USB headset (see Figure 2) during instruction that is synchronized with the web conferencing software (i.e., Skype or iChat) so that he or she can hear the coach. Through these technologies, the coach provides feedback as the new special educator teaches.

Figure 2: Wireless Headset Image

Digital Skype recording. In order to facilitate collaborative problem solving discussions, the online observations and coaching sessions are recorded through Call Recorder, software that digitally captures any Skype interaction. These recordings are then uploaded to a secure password-protected website for the new teacher to watch prior to the follow-up collaborative problem solving conversation with the coach. As the new teacher and coach conduct post-VBIE discussions, they refer to the recorded instructional sessions.

Applications for Teaching and Learning

Similar to new teachers in other states, many special education teachers in Ohio receive only limited mentoring. For teachers working in rural settings with students with significant needs, this mentoring support may be limited given the nature of low-incidence disabilities in rural areas. In southwest Ohio, it became evident that to meet the needs of these teachers, cross-institutional collaboration and coordination needed to take place between faculty in the Division of Special Education at the University of Cincinnati, the Ohio Center for Autism and Low Incidence (OCALI), the Regional Autism Advisory Council of Southwest Ohio (RAAC), and the local rural school districts. This collaboration continues to grow and currently includes resource sharing, coaching support, and coordination efforts with school districts.

Supporting coaches' use of e-mentoring technologies. The virtual coaches in our program are highly skilled face-to-face coaches with many years of experience. We utilize information about the coaches' background and specific areas of expertise to match them with new teachers but recognize that each coach, individually, may not have the entire range of expert skills and content knowledge needed to support their new teachers. They benefit from relying on each other's knowledge and expertise. Therefore, to facilitate coach collaboration, our asynchronous community of practice includes an area for the mentors to collaborate, share information, and address issues that emerge. The mentors share general information, resources, and tools in the "resources" area so that the other mentors can use those resources with their mentees. They also have active discussions about individual teachers and their needs in order to collaboratively problem-solve challenging issues that may be difficult to navigate alone. Last, we support our mentors by utilizing both an online facilitator to assist with content needs and technology support to assist with any technology challenges. For example, the content facilitator connects the mentors with available resources, such as online modules and tools, and also coordinates the large-group asynchronous discussions. The technology facilitator helps the e-mentors and new special educators initially set up their webcams and wireless headsets to integrate with Skype, problem solve any issues with the school districts related to firewalls, and access other general technology supports. Both facilitators fulfill an essential role in supporting the e-mentors and their new teachers.

Although the e-mentors have significant face-to-face coaching experiences, they may not, however, know how to translate those skills to an online environment. In order to increase their ability to support teachers in an online environment, the coaches' professional development focuses on general effective coaching and ways of translating those skills to online contexts. We consider their professional learning similar to that of the new teachers; we cannot present a few professional development "seminars" and expect them to automatically apply those skills into their coaching repertoires. Rather, their professional learning must be embedded in their practice. For example, after initial introduction to virtual coaching, the e-mentors practice their new skills with each other. They work through the technology learning process with each other, dial into experienced teachers' classrooms and practice virtual BIE coaching, reflect with those teachers, and brainstorm together about how to improve their practice. Once they feel confident in using the technologies and the practice of virtual coaching, they begin coaching their new teachers. As they coach, the e-mentors have an online community of practice dedicated to their professional development and collaborative problem solving. Additionally, the other e-mentors, content facilitators, and technology support staff provide ongoing feedback, resource support, and coaching strategies.

Supporting new teachers' use of e-mentoring technologies. Prior to beginning e-mentoring with new special educators in rural settings, several steps must be taken to ensure that the schools in which the teachers work can support the virtual coaching work. As this project is a collaboration between the University, OCALI, the RAAC, and local school districts, there is already district support for the e-mentoring efforts. This strong administrative support helps facilitate collaboration with the instructional technology staff at the new teachers' schools regarding (a) which technologies would best work within those specific school contexts (e.g., if the school has wireless Internet, they may use the IPod Touch cameras, and, if they do not, they may use more traditional webcams connected to computers in the classrooms), (b) opening of fire walls in the schools to allow for Skype interactions, and (c) any support they would need in using the technologies. Once the new teachers have the necessary technologies and are assigned e-mentors, they receive similar support in learning the new technologies as the mentors. For example, they are provided with experiences addressing familiarity with their assigned e-mentor, the technologies used for virtual BIE coaching, and the online community of practice.

Connection of Synchronous and Asynchronous E-mentoring Communication

The purpose of our e-mentoring program is to provide comprehensive supports that otherwise may not be available to the new special educators working with students with significant disabilities in rural settings. Consequently, both synchronous and asynchronous supports are integrated into the system. As discussed above, the synchronous components provide immediate help, coaching, and problem solving. The asynchronous components support the synchronous efforts by focusing on professional learning, resource sharing, and communications between the new teachers around "big picture" topics, such as structuring an effective classroom, extending social communication, and increasing academic rigor. The synchronous and asynchronous efforts are seen as synergistic and equally important.

CONCLUSIONS AND RECOMMENDATIONS

In this chapter, we provide a brief overview of what is possible in the area of e-mentoring. For early career special educators, e-mentoring offers a tool that could be the difference between classroom success or departure from the rural school, let alone the profession. The teaching profession has an unprecedented opportunity to harness this powerful tool as we further conceptualize how best to support new teachers. For teacher mentoring, e-mentoring can include just-in-time supports, meaningful interactions, direct observations, and access to a professional competent to offer the critical guidance and support. Highly specialized mentoring can be offered that often is unobtainable in the rural environment due to lack of school- or district-based expertise. In addition, technology innovations only will further what is possible in and out of the classroom.

With this said, current school and district hardware, software, and security measures (e.g., firewalls) often prevent or frustrate e-mentoring efforts. Thus, further development and research is needed to offer multiple synchronous and asynchronous options while also providing the field evidence of the effectiveness of the e-mentoring process. Furthermore, in the area of special education, educators and researchers need to consider the unique components of special education and how teacher induction efforts require alternate supports not available in current general education mentoring supports.

Special education teachers are at risk for leaving the field or holding positions for which they are under-qualified and in need of professional support to develop the skills needed for their current positions. However, with access to mentors and on-going support from expert mentors, the outcomes for special education teachers in rural environments may be much improved.

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ADDITIONAL RESOURCES

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Chapter 9

DESKTOP CONFERENCING: UTAH STATE UNIVERSITY'S SOLUTION FOR QUALITY SUPERVISION AT A DISTANCE

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PROGRAM DESCRIPTION

Providing access to efficacious special education teacher training programs for all qualified applicants is particularly important in light of the critical shortage of special education teachers here in Utah. The Utah State University (USU) Mild/Moderate Special Education Distance Education Program began in 1995 to address this critical shortage of special education teachers by providing teacher education for individuals who live and work in the state's more rural and remote areas. Forty students are admitted to the program every 2 years, and they attend evening classes at 1 of 10 regional campuses throughout the state. Faculty located at USU's Department of Special Education and Rehabilitation (SPER) campus in Logan are simultaneously broadcast via a synchronous, two-way audiovisual and internet system to each of the the regional campuses. Students who participate in the distance education program have access to the same instructors, are provided the same content, and fulfill the same program requirements as students who participate in USU's traditional campus-based program. Successful completion of this program leads to a Bachelor of Science degree in special education and K-12 teacher licensure in Utah.

The Challenge: Providing Quality Supervision for Field-Based Experiences at a Distance

The USU Mild/Moderate Distance Education Program delivers coursework via distance education technology along with the commitment and contributions of the SPER faculty and staff at USU. Although distance education students are required to complete the same courses and practica as campus-based students, it was logistically difficult during the beginning years of the program to provide students with the same quality of supervision and feedback during their field-based experiences as was provided to our campus-based students. While students who participate in the campus-based programs received supervision and feedback from both the cooperating classroom teacher and a university faculty member, the distance education students were receiving supervision from the cooperating classroom teacher only. Master teachers in the distance program localities attended an 8-hour workshop to learn our supervision protocol, and USU faculty traveled to the localities of the 10 regional campuses to conduct at least one reliability check during the practica semester. Although the cooperating teachers were adept at accurately recording teaching behaviors, many were not experienced or confident enough to provide the necessary corrective feedback. They often waited until the end of the semester to share their concerns with university faculty, making remediation of student deficits difficult. The lack of university involvement in supervision has been associated with cooperating teachers feeling less than confident about their ability to effectively direct and coach the student (Shea & Babione, 2001), and practicum students who were supervised solely by their cooperating teacher may not have received the feedback necessary to develop important effective teaching behaviors.

Many distance education programs around the country, particularly those that serve rural and remote areas of the country, have reported similar difficulties (Harriman & Renew, 1996; Heimbecker, Medina, Peterson, Redsteer, & Prater, 2002; Hilikirk et al., 1996; Knapczyk, Rodes, Marche, & Chapman, 1994; Simpson, 2006). In a study of the performance of USU special education student teachers, ratings of distance education students' use of effective teaching skills were lower overall than ratings of campus-based students (Davey & Stenhoff, 2004). Since many of the cooperating school districts in our distance program are 100 to 500 miles from USU's main campus, assigning faculty to conduct in vivo observations of our distance students is both cost and time prohibitive. The challenge, therefore, has been to identify and implement a sustainable technological approach that would allow USU faculty opportunities to conduct high quality observations of distance learners in remote school district classrooms without traveling long distances and incurring significant travel costs.

A promising approach to field-based supervision in distance education programs for many institutions has been the use of electronic two-way audiovisual conferencing. This format allows both university faculty and local cooperating teachers to provide supervision to practicum students (Bruder, 2000; Dundt, & Garrett, 1997; Dymond, Renzaglia, Halle, Chadsey, & Bentz, 2008; Falconer & Lignugaris/Kraft, 2002; Fry & Bryant, 2006; Gruenhagen, McCraken, & True, 1999; Shea & Babione, 2001; Thurston & Sebastian, 1996; Venn, Moore, & Gunther, 2001). An additional benefit of this approach is the opportunity for professional development of the cooperating classroom teachers (Shea & Babione, 2001).

Although improvements in pre-service teachers' demonstration of effective teaching skills has resulted from the use of two-way audiovisual conferencing, the continued use of this technology after the initial development and field-testing has been poor. Barriers to the sustainable use of conferencing technology have been the expense associated with hardware (Bruder, 2000; Gruenhagen et al., 1999), poor Internet connectivity and video resolution (Dymond et al., 2008), and the mismatch of equipment between university and school districts (Shea et al., 2001). Differences in the mission and priorities of university programs and school districts and the need for collaborative leadership and problem-solving between school district and university personnel also can affect sustainability (Little, 2002; Whitford & Metcalf-Turner, 1999.)

History of Two-Way Audiovisual Conferencing at Utah State University

Our foray into the use of two-way audio-visual conferencing technologies began in 2000. Falconer and Lignugaris/Kraft (2002) provided two elementary classrooms in rural northeastern Utah with a Pentium 200 computer, access to an Internet connection, a modem, and a Sorenson En Vision audio/visual conferencing system. During a 10-week quarter, two reading practicum students and two student teachers in the distance program were observed by and provided with feedback from a USU supervisor located at the Logan campus. The distance students also received supervision from onsite cooperating teachers who were experienced USU supervisors. The cooperating teachers were trained in the use of the technology prior to the evaluation of the practicum students and student teachers.

The results of this 10-week electronic supervision field-test were promising. The Logan-based USU supervisor was able to model simple teaching behaviors during the web-based observation and feedback sessions, and students and supervisors both reported that the immediacy and frequency of meetings with the USU faculty supervisor enhanced the students' teaching performance in the classroom. Furthermore, the onsite cooperating teachers reported that they were comfortable discussing student problems with the USU supervisors during web-based conferences, and the technology facilitated earlier reporting of classroom issues. The fact that the hardware and Internet connections were limited to the two elementary classrooms and not portable was a severe limitation, as was the need for constant technical assistance during web-based observations and meetings. At the time, the audio and visual resolution was not sufficient to see and hear everything that occurred during a lesson, and the bandwidth capabilities did not fully support consistent and reliable transmissions.

We also learned how to structure observation sessions within the context of a web-based setting as opposed to operating as if we were conducting an in vivo observation. We realized that copies of lesson plans and instructional materials needed to be sent to the USU supervisor via email prior to the scheduled observation, and copies of the USU supervisor's evaluation needed to be sent to the practicum student in a timely manner. Participants in this experience also reported that exposing everyone to the technology prior to the observations, including the distance learners and the elementary students they work with, would reduce both disruptions from the children and reactivity from the adults throughout the observations.

Despite the limitations of this investigation, the benefits that we obtained from this initial foray were compelling enough to continue our pursuit of a desktop conferencing system that would meet the needs of all of our distance learners. As the program increased its geographic footprint from 2 to 10 rural locations in the state, and our school district partnerships grew from 3 to 27, it became critical to identify cost effective, portable technologies that could easily be moved from one classroom to another. In 2006, we began evaluating a system that included Logitech™ Quickcam Pro 5000 webcams, D-Link™ Skype™ USB Phone Adapters, Panasonic™ digital cordless phones, and web-based observation sessions that were scheduled through Macromedia™ Breeze. The entire hardware package cost less than two hundred dollars, and we provided packages to students involved in the field tests through university and federal grant funds. In addition, affordable desktop cameras at the time, such as the QuickCam Pro, provided high resolution images up to 12 feet, and we included 6-foot USB extension cables to accommodate larger classroom spaces where the camera might need to be closer than the location of the classroom computer. We chose these specific hardware components because they were compatible with either PC or Mac computers found in most participating school districts, and were easy to install via USB plug-ins. To enhance sustainability, the equipment specifications were determined prior to field testing the system by surveying all potential participating school districts. We used Macromedia™ Breeze (now Adobe™ Connect) at the time because the university had a site license that allowed university personnel free access. To establish the school district-based infrastructure for the web-based supervision sessions, we contacted the Directors of Special Education for each school district and reviewed a Memorandum of Understanding that explained the equipment requirements, the necessity for the network administrator within the district to provide access to Macromedia™ Breeze, and, most important, the fact that access to the observation sessions was limited to only those participants who received the specific URL for the session. In addition, we articulated the fact that we do not archive any of our observation sessions, as this was important to district administrators for confidentiality reasons.

In the fall of 2006, we evaluated this package with students (N=21) who were participating in a math instruction practicum in middle or high schools in 15 different school districts. The schools were located between 100 and

350 miles from the USU campus. Students were matched according to GPA, the onsite supervisor's prior experience, and locality, resulting in five matched pairs. The students in the experimental group were provided with the hardware and a CD that contained detailed instructions on how to plug in the hardware and install the software necessary to run the camera, access, Skype™, and log into the Macromedia™ Breeze web-based meetings. The instructions included contacting the school district network administrator to obtain a password for access to Macromedia™ Breeze. An instructional technology graduate student at the USU main campus was available via email to provide technical assistance. Two "dummy" meetings were scheduled during the first 2 weeks of the semester, prior to the university students beginning their practicum. This was done to acclimate the middle school and high school students to the hardware and meeting transmissions, as well as provide the practicum students and cooperating teachers with opportunities to become comfortable with the technology. These preliminary meetings also allowed the USU supervisor to make sure that the cameras and cordless phones were positioned in a manner that allowed her to see and hear the entire lesson.

During the 10-week practicum period, four observations were conducted for all students. Cooperating teachers, who participated in an 8-hour supervision training 2 weeks prior to the semester, supervised the students in the control group. The students in the experimental group were supervised by the cooperating teacher and a university faculty via a web-based meeting. All students in the practicum were required to email the university faculty their lesson plans for the observation lesson by 5:00 on the day prior to the observation, allowing the faculty member to review the lesson plans and follow along during the observation. The cooperating teachers scheduled all of the observations and emailed the date and time to the university supervisor. The university supervisor would then schedule the web-based Macromedia™ Breeze meeting for students in the experimental group and email the URL to the student and cooperating teacher. Web-based observations were conducted in the same manner as "live" observations. At the end of the observations, the practicum student, local supervisor, and university supervisor reviewed the observation with the student, and the university supervisor provided feedback. If the schedule did not permit a feedback session immediately after the observation, the university supervisor would schedule another meeting time and email the URL. A copy of the university supervisor's observation form was faxed to the student and cooperating teacher at their school after the feedback session ended.

The evaluation score for each observation is expressed as a percentage, and the fourth and final evaluation score reflects a student's cumulative performance over the semester. The results of this evaluation indicated that, while both groups progressed throughout the duration of the semester, students in the experimental group received higher end-of-semester ratings ($\bar{X}$ =98.5%) than their control group counterparts ($\bar{X}$ =90.5%). Furthermore, students who were at risk for failure were identified earlier in the experimental group than in the control group. The student at risk for failure in the experimental group was identified before the second observation, or 4 weeks into the semester, and the two students who were identified for failure in the control group were identified 1 week prior to the fourth observation, or 12 weeks into the semester. Students and supervisors who participated in the electronic supervision also reported being more satisfied with their experience than the students and supervisors who did not receive electronic supervision, and supervisors who participated in the electronic supervision reported that they were more confident about their ability to supervise and provide feedback to practicum students.

As a result of our preliminary work with web-based supervision systems, we decided to evaluate this approach with all of our distance students across several different field-based experiences. Through a U.S. Department of Education Personnel Preparation Grant, we were subsequently able to provide all 32 of our distance education students with a supervision package that included a Logitech™ QuickCam Orbit camera, a BlueAnt™ Supertooth Light hands free speakerphone, a Cirago™ Bluetooth USB Dongle, and a Caliphone™ USB headset. Through additional testing, we found that running the audio through the classroom computer connected to a Bluetooth hand free speakerphone was more reliable than the cordless phones and D-Link adapter used in our previous study. Students also reported that the small hands free speakerphone, which is the size and shape of a deck of cards, was less intrusive than the cordless phone during instructional times. We adopted the Orbit camera because it could be set to respond to movement within the classroom, and offered optimum resolution up to 16 feet. We also changed our web-conferencing program from Macromedia™ Breeze to either Skype™ or Elluminate™ because USU began charging faculty for meeting time, and Elluminate™ and Skype™ offer free versions of their web-conferencing software. In addition, we found that both Elluminate and Skype were much more familiar and user-friendly to the majority of our students and required less technical assistance. As with our previous electronic supervision package, students and school district personnel were given a comprehensive, yet user-friendly, protocol for installing the hardware on a classroom computer and an instructional technology graduate student was available for technical support when needed. The cooperating teachers were again trained to observe our distance students in their practicum classrooms, and the combination of live and electronic supervision provided our distance students with high quality supervision and timely feedback. Collectively, we electronically supervised 52 students in reading and math practica, and another 31 student teachers were supervised via web-based observations across 36 schools that were located in

17 different school districts by the end of the Spring 2011 semester. The iterative model of field-testing to produce data for analysis and feedback continuously helps us determine the efficacy of our latest installation instructions, technical assistance support, portability of the equipment, and student and onsite supervisor satisfaction with the hardware, software, and university supervisor participation.

CONCLUSIONS AND RECOMMENDATIONS

Our experimentation with and evaluation of web-based supervision protocols over the past 15 years has led to an effective, sustainable, and affordable method for providing high quality supervision and feedback for our distance learners during field-based experiences. University faculty are able to directly shape critical instructional and management behaviors that are associated with student success and provide consultation to teachers and staff in rural schools that can lead to improvements in the classroom experiences of future USU distance learners. Although the technology continues to evolve rapidly – built-in cameras are now almost ubiquitous among laptop computers and tablets - the general procedures we use to offer synchronous observations with timely feedback of our distance pre-service teachers has developed more gradually over the past 15 years. The constant experimentation and evaluation of our program has made a tremendous impact on the quality of our distance teacher education program. We recommend that other distance teacher preparation programs serving students in remote locations adopt a web-based approach to supervision, and based on our now vast experience with these formats we offer the following two suggestions for institutions that may be at the beginning of this journey:

1. *One size does not fit all.*
   There are many hardware and software options from which to choose. Experiment with different packages in one or two classrooms before deciding on the package that is right for your program. Also, know that what you choose will be out-dated in the not-too-distant future, so stay up to date on hardware and software improvements. The number of students in your program, the degree to which the hardware needs to be portable, the Internet connections in the schools you work with, and the types of instructional activities you observe during field-based activities are all factors as well as the cost of the equipment. Buying the most expensive camera may provide optimal resolution but may not be sustainable in the long run.

2. *Include instructional technology staff on your development team.*
   Having someone in the mix with technology expertise is critical and will assist you in making efficient decisions about the technologies you try. Developing a partnership with the instructional technology department at your institution or an institution in your area is an interdisciplinary way to recruit technical assistance for the development of a web-based supervision approach. You also will find that this individual will be helpful as you establish relationships with school district network administrators.

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Chapter 10

USING VIDEO CONFERENCING FOR TEACHING AND SUPERVISION: SELABA DOCTORAL PROGRAM AT THE UNIVERSITY OF KENTUCKY

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PROGRAM DESCRIPTION

The need for licensed teachers and specialists in the area of moderate to severe disabilities has been a point of concern for the past two decades; however, technology is increasingly being used to deliver instruction and assist in providing supervision and consulting for students in need of certification in diverse fields through synchronous online learning environments (Luna & Medina, 2007; Spooner & Wood, 2006). The use of these technologies, such as video and web conferencing, are an increasingly popular and viable option for educators and teacher candidates living in rural locations or that have schedules that may not allow for travel to on-campus meetings. In response to this need, the University of Kentucky (UK) Department of Early Childhood, Special Education, & Rehabilitation Counseling, has been delivering instruction through satellite, interactive video, and web-based course management systems for 30 years. This chapter describes how UK has increased their capacity to serve students by using distance education technologies not only for course delivery, but practicum supervision as well (Collins & Baird, 2006).

CONTEXT

Online learning has become more and more popular among today's college students, owing to the rapid expansion of progress in Internet technology and Internet use (Wei & Chou, 2015). Students may take online courses that are presented in both synchronous and asynchronous formats, without time and space limitations (Allen & Seaman, 2012; Kaymak & Horzum, 2013). Both synchronous and asynchronous formats include web conferences, self-paced learning modules, video case studies, webinars, interactive television, live conference calls, and discussion boards. These formats are increasingly used to provide diverse learning opportunities for students pursuing degrees or additional certification in teacher preparation programs (e.g., Elford, Carter, & Aronin, 2013; Rock et al., 2014; Schmidt, Gage, Gage, Cox, & McLeskey, 2015). In synchronous formats, students participate in lectures or communicate with their peers in real time. Text chats, webcasting, and conferencing in audio/video or virtual classrooms often are used in synchronous technologies (Bullock, Gable, & Mohr, 2008; Ludlow, Collins, & Menlove, 2006). Boettcher (2005) posits that synchronous environments can be used for small groups (two to six participants), making use of activities such as office hours, group discussions, meetings or tutorials, or large groups (up to 100 participants) found in workshops or conferences.

Several universities are identifying uses for synchronous technologies to provide both instructional and supervision services to students who may be limited by geographical location or personal schedules (e.g., K-12 teaching). The use of synchronous technologies currently is being examined for not only practicality but also cost effectiveness. Schmidt et al. (2015) described a prototype mobile distance education supervision system that has been to supervise teacher interns in their field-based teaching experiences. Developed as part of the University of Florida's Restructuring and Improving Teacher Education 325T grant project, the system included live streaming video of teachers in rural classrooms using iPad Mini's with 4G-LTE cellular network connectivity and a variety of peripheral devices to provide enhanced optics and a multi-sourced audio. According to Schmidt et al., over a 4 year period supervision of one student would cost $6,600 using traditional supervision, as compared to $3,425 for distance education, thus, making the online supervision option both a practical and cost effective choice for both the IHE and the student.

Synchronous technologies are not only a practical option for course delivery, but also field supervision. University practicum supervisors now observe students in classroom placements using "bug-in-the-ear" technologies, in which two-way communication is used to provide instruction and feedback using Bluetooth devices in combination with transmitting video via the Internet (Dymond, Renzaglia, Halle, Chadsey, & Bentz, 2008; Rock et al., 2009). Pemberton, Tyler-Wood, and Restine (2006) described how the Educational Diagnostician Program at the University of North Texas (UNT) used both a course management system and Tandburg, a video conferencing system, to deliver courses and supervision to help students acquire their certification as Educational Diagnosticians. In addition to the Tandburg video conferencing software, the UNT program used the Polycom View-Station camera system, which allowed supervisors to view the students in real time, administering assessments and collecting data.

National University has used IRIS Connect, a secure online system which allows for remote live video stream with audio controls for real time observations and feedback. Some features of IRIS Connect include the ability to remotely control a 360-degree field of vision in the classroom with the ability to pan, tilt, and zoom, as needed. The platform provides a secure environment to allow the observer at the university and the teacher in the classroom to discuss confidential matters within a secure platform. In response to a survey sent to various stakeholders in their teacher preparation program, respondents indicated that distance technology provided an effective method for supervision and evaluation of preservice teacher performance (Naffziger & Fawson, 2013). The following description of distance education technology used with a doctoral cohort at the University of Kentucky shows similar results as that of National University, in that supervision and evaluation occurred virtually with success. Coursework also was provided through distance education technologies for this cohort. The specifics of the program are described in the following paragraphs.

A cohort of doctoral students at UK fulfilled part of their course and certification requirements using interactive video. The students, recipients of a fellowship grant, pursued a PhD in Special Education, course work and supervision experience towards becoming Board Certified Behavior Analysts® (BCBAs®), and a graduate certificate in distance education delivery. The purpose of the fellowship grant, Special Education Leadership Program in Applied Behavior Analysis (SELABA), was to converge specialty in the areas of Applied Behavior Analysis (ABA) and special education teacher preparation with a distance education component. Part of the cohort's coursework required that they receive supervision during their delivery of behavior consulting services to local teachers, parents, and other care providers.

The goal for the doctoral students was to become qualified to assume leadership positions in the field of special education in both high and low incidence disabilities with a focus in ABA. Through a systematic program of studies and field experiences, the doctoral students were trained in the identification of evidence-based behavior management and academic strategies to help students with disabilities. The doctoral students also were trained to teach these strategies to graduate and undergraduate students in the field of special and general education. The SELABA program required that students complete teaching, supervision, and consulting practica to build skills necessary to be successful in faculty positions. To meet part of the requirements to receive the Behavior Analyst Certification Board® certification, an individual who is a current BCBA® must supervise the students conducting their field study work. Supervision and coursework specific to the BCBA was provided using web conferencing. The students took courses using live web conferencing to meet course requirements for both instruction and supervision of their training in the field of behavioral consulting.

TECHNOLOGY FORMATS

Two web-based applications, Skype and Adobe Connect Pro, were used for supervision meetings. Confidential information and documents were exchanged through the use of Adobe Connect Pro, while Skype was used as a backup application for communication when Connect Pro was inaccessible by one of the participants; however, the level of security provided by Adobe Connect Pro to maintain confidentiality of all participants and subjects caused it to be the preferred method for correspondence and communication. The instructor supervised students using real-time video and recorded observations. The instructor created a virtual classroom environment within Connect Pro where students attended each session.

Adobe Connect Pro allows the instructor to create a classroom environment specifically suited to the class needs. Virtual meeting spaces are developed in which classes meet. Adobe Connect Pro is similar to other group meeting software with some unique features. such as its use of secure sockets layer (SSL), which contains a dual network of servers. Students must be "invited" into the room by the instructor, which increases the level of security. The Flash Media application serves real-time meeting connections, while the Connect Pro application secures the HTTP connection. Some tools available within this interactive classroom environment include a virtual whiteboard, instant messaging tool, and universal voice for use with most any telephony device, webcast for up to 80,000 participants, including complete audio, video, PowerPoint (PPTX), and slides. Other features include question and answer polls; attendance and participation tracker; secure document sharing, PDF collaboration tool – for synchronous, real time use within a share pod or unsynchronized use – for viewing purposes only; audio through virtually any computer speakers or phone and video converted to flash streaming, both using integrated telephony partners and improved VoIP for enhanced audio recording; and live VMware support for virtual environments. These improved or recently added features allow participants to securely share their desktop screens, PowerPoint, and PDF documents for synchronous viewing or real time collaborative editing using Connect Pro. According to Adobe Systems, Inc. (2009), Connect Pro is accessible in both Mac and PC operating systems. Class members participate in this multi-feature, didactic classroom environment in order to facilitate the fulfillment of bi-weekly required supervision. The student technology requirements include basic computer skills, computer with web-cam capabilities, speakers/headphones, and ability to connect to the Internet.

Skype functioned as a back-up platform when participants encountered technology problems using Adobe Connect Pro. Skype was accessible to all participants. Multiple access points through video, audio, and interactive document exchange are available; however, security is limited. Skype ensures security through your security system and its use of password security on its site through a digital certificate and encryption. Audio and video capabilities of Skype and Adobe Connect Pro are not comparable in a number of ways. One example is Connect Pro does not allow entry or any visible access to the page without specific entry from the facilitator. At no point, does any person involved in that particular meeting see who might be attempting to call or enter the meeting. This is unlike Skype where all involved in a group call situation can see the name and sometimes picture of the person calling. This might serve to break confidentiality of the caller in some manner.

APPLICATIONS FOR TEACHING AND LEARNING

Students in the SELABA cohort participated in a three-credit class, "Behavioral Consultation in the Schools," and a one-credit practicum held each semester, "BCBA Supervision," via live web conferencing using Adobe Acrobat Connect Pro. Students met weekly for class within a secure domain, named the "Behavior Room," in which webcams and microphones allowed participants to interact with one another. Without headsets, participants needed to activate their microphone each time they spoke. However, the use of microphone headsets allowed participants to leave their microphones on without encountering feedback.

During class time, the instructor delivered course content through interactive discussion, use of the whiteboard, PowerPoint uploads, and video uploads. During instruction or while participants shared a case study, the instructor used the whiteboard to diagram the behaviors occurring in the case study or to document important concepts. This served a similar purpose as a whiteboard in an on-campus classroom in that all participants could see the whiteboard and it could enhance the conversation occurring in the class. PowerPoint uploads were used mainly for participant presentations on case studies. Participants uploaded their PowerPoint presentations to Connect Pro and controlled the slides from their desktops. In addition, when participants showed video of consulting sessions or the instructor used video to illustrate a concept, these were uploaded for viewing by all participants.

Students met bi-weekly for supervision of practicum hours using a similar format as used during the 3-credit "Behavioral Consultation in the Schools" course. During practicum supervision, there were occasions when students met individually with the instructor to discuss specific clients. In these situations, Connect Pro was used since the practicum supervisor was in Arizona and the participants were in Kentucky. These individual meetings served a similar function as a traditional office visit with an instructor.

Adobe Acrobat Connect Pro contains several features that mimic a face-to-face classroom setting. For example, in a face-to-face classroom, a participant can raise his or her hand for permission to speak. In Connect Pro, a button exists to mimic raising a hand. When participants push that button, a hand icon is displayed next to the name of the requesting participant on the participant list. The instructor (or other speaker) can call on that participant to speak at the appropriate time without disrupting the flow of the instruction as in a face-to-face classroom. A second feature is the instant messaging option. Instant messaging allows for addressing all participants, the instructor only, or individual participants. This feature allows for communication that might be necessary but not pertinent for the whole group.

In many ways, Connect Pro brings the comfort of a face-to-face classroom to the virtual setting. Students' preparation involves little more than what is required for preparation in a traditional class with the exception of making sure to have the necessary technology, including a computer, a webcam, and a microphone. Uploading content is as simple as attaching a document to an e-mail with minimal time required for uploading, depending on the size of the file. The purpose of the courses in this example brought students at UK to the instructor at a distance in Arizona. Connect Pro is a viable option for connecting students and professors around the world into a common, virtual classroom.

CONCLUSIONS AND RECOMMENDATIONS

As the need for continuing education continues to increase for those in education due to new accountability standards and requirements for highly qualified teachers, those in rural areas may struggle to access continuing education services from universities as training opportunities or certified staff are often not available. Students who live in rural and urban areas may have time constraints due to job requirements and family responsibilities, as well as traffic, in order to get to on-campus courses that are located in cities (Spooner, Knight, Lo, & Wood, 2007). In addition, faculty and university resources are often quite limited (Collins, 1997). When faculty members are required to travel long distances, these resources become even more vital; therefore, not only do students benefit from distance technologies, but faculty are able to reach more students with fewer resources (Scheeler, McKinnon, & Stout, 2012). The method that universities use to provide opportunities for distance learning and supervision should be carefully considered. Rock, Gregg, Gable, and Zigmond (2009) provided some helpful tips for improving services for in-service teachers in terms of preparation and support, such as using mobile and Bluetooth technology to increase immediate and effective feedback. Departments of education could benefit from considering these suggestions, along with consulting other published studies on distance education programs, in developing their own distance education programs.

IHEs must carefully select technologies that address needs, such as critical shortages of professionals in areas such as special education, and select software (e.g., Blackboard and Apple QuickTime streaming) that delivers classes to reach students in remote locations (Ludlow & Duff, 2006; Rude & Ferrell, 2006). The implications of reaching these students may be successful, and what the students learn may last beyond their graduation from the program in which they participated (Rude & Ferrell, 2006). This example of how distance education was used at UK with one particular doctoral cohort is one of the many ways IHEs are utilizing technology as a means of delivering both content and supervision when resources may not be available.

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Skype: www.skype.com

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Chapter 11

A PROJECT TO PROVIDE EARLY INTERVENTION SERVICES USING VOIP IN RURAL UTAH

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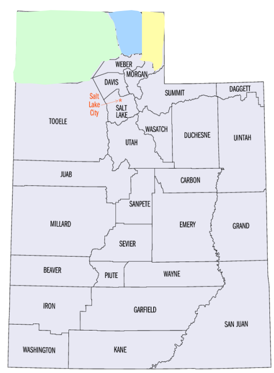
PROGRAM DESCRIPTION

The Virtual Home Visit project evaluated the feasibility of using videoconferencing over Internet to connect early intervention service providers with families of children (birth to 3) with developmental delays or disabilities. The Up to 3 early intervention program at the Center for Persons with Disabilities (CPD), Utah State University (USU), is a contracted service provider with The Utah Department of Health. Up To 3 provides Services under the Individuals with Disabilities Education Act (IDEA), Part C within a three-county area in northern Utah, approximately 7,819 square miles.



Part C of IDEA requires "to the maximum extent appropriate to the needs of the child, early Intervention services <u>must</u> be provided in natural environments, including the home and community settings..." (34 CFR § 303.12(b)). The provision of consistent high high quality home- and community-based services to children living in rural and frontier areas is a challenge. Distance, weather, geographic terrain (e.g., mountains, canyons) and availability of pediatric service providers increase the challenge to ensure appropriate and equitable services. According to Raikes, et al. (2006), the quantity of services provided in early intervention is a predictor of parent outcomes, such as perceived supportiveness, support for language, and quality of home environment; all of these contribute to better child outcomes.

The Department of Special Education and Rehabilitation at USU has extensive experience providing distance education through a videoconferencing format. This knowledge and the need to increase early intervention services in rural/frontier areas grew into the concept of *Virtual Home Visits (VHV)* that use videoconference visits to supplement face-to-face home visits. In additional, the investigators wanted to determine whether virtual visits would increase the amount of modeling and coaching provided by service providers and decrease the use of therapist-directed clinical services. Ideally, virtual visits would require the service provider to assume the role of a coach, teaching the parents to implement intervention strategies that would promote their child's development. Last, the investigators posed that, through a coaching model, parents would have an increased level of confidence and would regularly embed the intervention strategies into their daily routines.

TECHNOLOGY FORMATS

To assure that VHVs were feasible, staff assessed the availability and quality of videoconferencing software and hardware and identified rural/frontier Internet providers (IP). Broadband is currently available through satellite, wireless technology, phone company IPs in the form of DSL or fiber optics, and through cable company IPs in the form of fiber-enhanced broadband. All of these types of Internet providers were evaluated. The cable and DSL systems were rated satisfactory by parents and providers. Wireless cards were slowed during high traffic use and required "open line of sight" to the sending radio tower. The USB wireless had frequent video buffering, audio delays, and echo. The satellite IP was twice the cost and was not as reliable (signal latency, line of sight issues) as cable and DSL. Internet provider costs ranged from $35.00/month for dish and cable services, $59.00/month for wireless cards, and $75.00/month for satellite service. Installation charges and mandatory contracts were negotiated for reduced rates and no contract agreements. Internet services were purchased for those families who did not have Internet service. The cost of the Internet was offset by the monthly cost saving in personnel travel time and the corresponding mileage reimbursement.

Four Voice over Internet Protocol (Voice over IP, VoIP) videoconferencing software applications were tested during the 2 years of the project. Numerous software factors were considered and evaluated, including cost, ease of download and use, ability to record visits, usability by Mac and PC, availability to rural/frontier families, and split screen view of both the parents and service provider. Breeze (now Adobe Connect) and ooVoo were used in Year 1. VZOchat and Skype were selected for Year 2 based on a comparison of latency and quality of sound and picture.

Breeze (Adobe Connect) is an application used in business for meetings and distance education delivery. The current website (www.adobe.com) indicates, "Participants need only a web browser and Adobe Flash® Player software" (downloaded Sept, 2010). No software download is required and the application provides a secure server for delivery and storage of session recordings. The upgrade ConnectNow offers the users conference features like screen sharing, chat, notes, whiteboard, audio, and video to conduct meetings online. The software is available for Mac and PC; upgrade costs start at $45 per month.

The ooVoo application (basic) is a free software download that requires high speed Internet and a standard camera, microphone, and speakers. Also available is ooVoo business that allows for contact with up to six participants on a video call and permits an additional six participants to be connected by telephone. Cost of ooVoo business is $39.95 per month. The VZOchat website, vzochat.com (September 2010), indicates "VZOchat video chat software is designed to work with virtually any PC video camera that supports a 320 x 240-output resolution via Microsoft DirectShow (WDM) driver." This software permits recording of two-way audio during the meeting but is limited to recording video of only one participant. The website offers troubleshooting for some sound and picture difficulties. VZOplus ($9.95/month) allows users to create 6 X 6 videoconferences and invite guests who do not have subscriptions.

SKYPE (Skype.com) is the most recognized Voice over IP. It requires a broadband Internet connection and the following specific computer requirements for voice and video calls: a computer with at least a 1GHz processor, 256 MB RAM, and a webcam and microphone, if not built in. SKYPE does not have an application to record sessions; Vodburner is one application available to record and edit Skype calls. By default, VodBurner is set to record all Skype video calls automatically. Vodburner provides limited technical help over email. The cost was $10.00/month per machine. Table 1 shows basic pros and cons of each system from our experiences and participant surveys.

The project loaned equipment to families who did not have a home computer or had one that was too old to support high speed Internet. Laptops were loaned to 40% of participating families in Year 1 and 35% of families in Year 2. Equipment costs included the following: 17-in screen PC laptops at approximately $1,100 each; videoconference phones at $250 each; cameras ranging from $10.00 to $75.00; and microphones/headsets ranging from $5.00 to $13.00. All equipment was returned in good condition.

Application for Service and Meeting Coordination

Sixteen early intervention service providers were assigned the use of one or more VoIPs each year to allow for comparison of use; families were only assigned one. Both providers and parents were trained to use the assigned application. An on-site group training was used in Year 1 to orient and train on the Breeze and ooVoo systems. An electronic tutorial was created for VZOchat and Skype for Year 2 training and orientation. The tutorial was located on the CPD website and could be accessed by the parent and provider at their convenience. An initial practice VHV was made with each family to discuss any concerns or problems with the signing on and off and the audio/video adjustments and to familiarize them with the recording requirements. Service providers also received an orientation to basic problem-solving related to audio/video problems and specifics of the recording procedures for each application. A list of "Helpful Hints" was developed and made available at each of the service providers' computer stations. Providers and parents became very adept at problem solving and joked that it wasn't "*If* there are technical difficulties but w*hen*." This attitude encouraged participants' patience with difficulties that could (and did) arise. Difficulties included problems, such as slow transmission due to limited bandwidth during peak use times, echo, frozen image, and buffing delays. Service providers reported slightly higher levels of frustration than parents. On the post-computer literacy survey, 87% of the early intervention providers reported they were comfortable with the 10 technical skills required for VHV. Parents also reported high levels of comfort.

VHV services were incorporated into each child's Individualized Family Service Plan (IFSP). Initially, VHVs were added as additional visits. Over time VHV services sometimes replaced face-to-face visits as confidence with the videoconferencing software and service provider coaching skills increased. Typically, each family received VHVs for only one of their prescribed services. One family received all of their services through VHV during RSV and flu season. Another received speech/language and physical therapy services through VHV as their preferred method of service delivery.

During the project's second year, VHVs were used to conduct transition meetings with local education agency personnel and to conduct service coordination meetings. This facilitated assembling team members and alleviated the need to travel for both staff and family. Families appreciated relief from having to transport children and arrange child care when they could attend meetings from home. One parent stated, "It is more convenient for me to communicate via VHV for this meeting rather than travel a significant distance with my children." School district representatives also identified the value of VHV meeting, "I think that it is a good idea for those families that live far away. It would be beneficial especially when the weather is bad." Adobe ConnectPro was used for meetings because it allows for screen sharing of documents, use of digital signatures, and electronic mailing of completed documents.

CONCLUSIONS AND RECOMMENDATIONS

This project set out to determine if VHV could be a supplemental means of face-to-face home visits, increase the amount of modeling and coaching used by service providers, and increase the use of developmental strategies in home daily routines. Findings included the following: (a) with a minimum of training, families and service providers are able to use videoconferencing to conduct home visits; (b) services provided in virtual and face to face formats were comparable; (c) virtual visits resulted in programmatic cost savings in travel and personnel time; (d) participating families were satisfied with virtual visits and confident in using those strategies intended to promote their children's development that they learned during visits; and (e) visits that would have been cancelled due to provider or child illness or adverse weather were conducted virtually, increasing the consistency of early intervention service and compliance with state and federal regulations.

Delivering early intervention over the Internet offers many qualitative benefits. Parents' comments indicated that VHVs were shorter and more to the point of intervention with less time spent discussing other non-related issues. One parent stated "We are a bit more to the point on virtual visits; we don't need as much time to do greetings before getting to business." Another reported, "It's a little easier for my daughter to get more personalized attention during the home visits, but, other than that, I felt like it was the same quality."

Observation of recorded visits indicated that providers used coaching, both during face to face and virtual home visits. Providers reported differences in their use and knowledge of coaching strategies during their experience with this project. For example, one provider defined coaching before implementing VHV as "giving the parents feedback and suggestions about what they want to happen." At the end of the project, the same provider defined coaching as "Coaching is helping the parent to promote their child's development. It is not taking charge. It is discussing options and modeling ways to accomplish that…and giving the opportunity to practice." A parent's comfort with coaching is related in the following comment from the post-project survey: "Hands on from therapist's end, but it makes me work with Jack and learn how to help him."

A benefit of virtual home visits to a service program is the cost savings. During the two years of this project, the Up to 3 program realized an average time savings per visit to rural families of 43 min and to families located in frontier areas of 3 hrs 20 min (round trip). The time savings transmitted into an average personnel cost savings per visit of $39.40 for a rural visit and $112.50 for a frontier visit. An additional savings to the program was the cost of mileage reimbursement to service providers of an average of $13.60 per rural visit and $122.45 per frontier visit.

Replication of the VHV model might be limited by the lack of Internet services sufficient to meet the technical requirements of the Voice Over IP systems. The lack of consistent bandwidth from dependable IPs was the underlying cause of many of the technical problems identified. Professionals' initial responses to change in how services are provided might also be an barrier. Although some Up To 3 service providers were initially skeptical about the practical use of Virtual Visits, all ultimately found the benefit of meeting the needs of rural and frontier families in a timely and consistent manner outweighed their concerns.

Any service program could feasibly implement a virtual home visit service model. It is recommended that the availability of Internet providers be identified and costs be negotiated prior to investing in needed equipment. Negotiations with the IP companies could address exceptions from contract limits, initial installment fees, etc. In our experience, the local, smaller companies serving rural/frontier cities were more forgiving of additional fees and contract terms than the larger companies. Individual programs would be advised to purchase several laptops for loaning and then rotate them through different families over the course of the child's eligibility

The level of computer skill and Internet experience is minimal for the implementation of VHV model. However, our experience indicates that programs should provide initial technical support for troubleshooting use of the videoconferencing software until users become efficient. Many of the troubleshooting steps/helpful hints can be posted online or in hard copy. Our findings indicate that even non-computer-savvy people learned to problem solve the routine problems with the Internet and the software applications.

Future applications of this delivery approach include replicating the VHV model with other rural programs to address their needs for increasing the frequency and address the shortage of qualified personnel. Qualified professionals with pediatric experience could provide consultative services from across the county or across the state. In addition, a program may offer more frequent visits via VHV into homes when parents need additional immediate support, for example, to implement behavior management strategies. Early intervention providers can coach the parenta multiple times per week with minimal impact to busy schedules. This application could feasibly provide a way for early intervention programs to connect families living in remote areas with parent support groups in other parts of the state. The authors of this chapter also are interested in exploring the use of videoconferencing when assessing a child's developmental skills. We wish to examine whether assessing a child over the Internet provides reliable results, decreases the amount of lapsed time between referral to Individual Family Service Plan and to intervention for children and families and the advantages of providing a permanent record (via the recording) of the child's initial level of performance for both parent and provider review.

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Chapter 12

MIXED REALITY ENVIRONMENTS IN TEACHER EDUCATION: DEVELOPMENT AND FUTURE APPLICATIONS

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PROGRAM DESCRIPTION

The TeachLive™ Lab at the University of Central Florida (UCF) is, to our knowledge, the first laboratory in the country using a mixed reality simulation environment to prepare pre-service teachers or retrain in-service teachers. The TeachLIVE™ Lab provides pre-service and in-service teachers the opportunity to learn teaching skills and to craft their practice without placing "real" students at risk during the learning process. Initially, TeachLivE™ was used at UCF to provide early teaching experiences for pre-service teachers. In 2009, Utah State University became the first partner to use the lab from a distance as part of a pre-service post-bachelors teacher preparation program. Shortly after staring work with Utah State three partnerships were developed with Old Dominion University, West Virginia University, and Greenville South Carolina University Center, and today over 75 universities across the United States and around the globe have used the TeachLivE tool to shape teacher practices.

So what is the TeachLivE™ Lab? Imagine walking into a room where everything looks like a typical classroom setting, including props, whiteboards, and, of course, students, but it is a virtual setting and the students in the classroom are avatars. The virtual students act like typically developing or not-typically developing students, depending on the objectives of the experience. Participants can interact with students and review previous work, present new content, master aspects of teaching pedagogy or work independently with one student or with a group of students. In an environment like this, prospective teachers learn the instruction and management skills needed to become effective teachers while practicing teachers can refine their skills in just four 10-min sessions (Dieker, Straub, Hughes, Hynes, & Hardin, 2014). If novice teachers perform poorly or if experienced teachers want to experiment with new teaching ideas, using TeachLivE™ poses no danger to the learning of any real student. If a teacher, novice or experienced, has had a bad session, he or she can reenter the virtual classroom and try again to teach the same students the same content, concept, or skill. In real classrooms, students might get bored and become difficult to manage when an instruction or management routine is repeated. Moreover, in real classrooms only one or two teachers may practice an instruction or management routine with a group of students. In the TeachLivE lab, instruction and management routines may be repeated with an individual teacher or across several teachers using the same instructional context until the routine is mastered. The instruction or management context then may be changed systematically to examining how participants' respond to a changing classroom environment and learning of real children.

The TeachLivE™ environment was created by an interdisciplinary research and development team at UCF, led by three professors, each of whom has been as a Pegasus Professor, the highest honor bestowed on any faculty member at UCF. The leads in Education are Drs. Lisa Dieker and Michael Hynes. Dr. Dieker is a Professor in Exceptional Education and the Director of the Lockheed Martin/UCF Mathematics and Science Academy. Dr. Hynes is a Professor in Mathematics education, and the Founding Director of the Lockheed Martin Mathematics and Science Academy. The Computer Science and Digital Media team is led by Dr. Charles Hughes, a Professor in Computer Science and the School of Visual Arts & Design, and Co-Director of the Synthetic Reality Laboratory (SREAL) at the UCF Institute for Simulation and Training (IST).

TeachLivE™ combines UCF's expertise in military and corporate training, entertainment, free-choice learning, and rehabilitation (Hughes et al., 2005) with the high quality teacher preparation in the UCF College of Education and Human Performance (CEDHP), the basic computer science research of the Department of Computer Science (CS), the expertise in simulation and cognitive sciences at the UCF IST, and the integrative strengths of SREAL. The TeachLivE™ simulator is based on the theories of Maslow (1954) along with the work on behavioral principles of Dreikurs (1968) and the observations of adolescent behavior by Long (1975), all having a strong scientific research-base in the educational literature. The simulated environment enhances teachers' understanding in both content and pedagogy. In the TeachLivE™ environment, teacher educators can decouple basic pedagogy, specific content, and classroom management, allowing teachers to work on targeted skills and sequentially build an increasingly complex teaching repertoire. In the virtual environment, teacher educators can provide a consistent teacher preparation program with immediate feedback and ongoing assessment with the purpose of the experience being to maximize teacher performance and ultimately the impact on student learning.

While virtual technology for training has had a long history in fields such as aeronautics, medicine and military training, the application of emerging and innovative technologies in teacher preparation and education is limited. The purpose of the TeachLivE™ environment is to positively impact teacher recruitment, preparation, and retention in education by allowing teachers to hone their skills with virtual children, providing a more ethical approach to learning the science of teaching. In the TeachLivE™ classroom, a teacher observes on the screen a synthetic environment inhabited by what appears to be students in a classroom. Though synthetic (or virtual), each student has a unique and appropriate personality for a member of the school population we wish to present to the teacher-in-training (trainee). When the trainee stands back in a typical lecturer's position, the virtual students express behaviors that are controlled by computer software we have developed. Each specific child's detailed back-story and personality was developed by one of our interactors.

In effect, an interactor guided our programming of the automated behaviors of one (or more) of the virtual students. These virtual students tend to misbehave or become more withdrawn (depending on the character's attributes) when the participant ignores them, responds to them incorrectly relative to the instructional routine, or shows little understanding of their personal motivations. The interactor or the educators working with the teacher can increase the intensity of the characters' responses, depending both on the participant's performance and the objective of the educational session.

So what is an interactor? An interactor is a person educated and prepared through a unique specialization at UCF called Interactive Performance. To play these virtual students, an interactive performer is prepared in psychology, improvisation, philosophy, and acting. In the TeachLivE™ lab, a trained interactor is employed each time a trainee uses the system. The interactor puppeteers the character currently being addressed by the trainee, while programmed behaviors provide movement, sounds and gestures to the other characters in the system. Importantly, the interactor watches the participant on a monitor throughout the teaching interaction. If the interactor observes that the participant is not responding correctly to the virtual student's academic or social needs, the interactor can increase that character's behavior to get the teacher's attention. In addition, the interactor can change the behavior of classmates in response to a particular character's behavior just like in a "real" classroom. Once the behaviors start to escalate, the agency underlying each virtual student's automated behaviors typically causes the discordance to rise slowly, but ever so surely, across the entire class. This combination of automated, semi-automated, and interactor-controlled behaviors is what gives life to the TeachLivE™ experience, causing many trainees to think they spent a half hour in instruction when the exercise typically lasts less than 5 min. Based on the development of this current work and past developments at UCF in simulation and training, this environment now is impacting the preparation of over 12,000 teachers annually.

Overall, the concepts developed and tested at UCF in the TeachLivE™ environment are based on the hypothesis that performance assessment and improvement are most effective in contextually meaningful settings. A common issue in the field of education is the lack of skill transfer from one setting to another (Boe, Shin, & Cook, 2007). This transfer issue is explicitly addressed in the TeachLivE™ Lab by creating as close to a real simulated environment as is possible before entering the "real" classroom. The results of a two-year study can be found on the teaclive.org website. Analysis of the data captured in this study confirms transference of skills learned in the simulator to the "real" classroom.

The challenge for using simulators in teacher education is two fold: (a) The cost of sophisticated simulators can run into the hundreds of thousands of dollars and (b) the level of realism currently available for a teaching scenario based on artificial intelligence alone is insufficient (as the process is too dynamic), and, even if attainable, the cost to create such a critical number of potential responses and to make changes based on evolving client needs would be cost prohibitive. Currently though, we have met these challenges by creating a low cost system with high fidelity to simulate many critical aspects of the classroom environment that includes life size virtual students and perspectives that align to the participant's position in the classroom relative to the students. The TeachLivE™ team at UCF created a dynamic system that allows for ongoing changes of scenarios that incorporate the emerging field of Interactive Performance in which a human allows for consistency within a constantly changing and realistic simulator. The interactor allows the avatars to adjust their behavior to that of the classroom teacher, similar to that of students in a typical classroom. The result is consistent but adaptive responses in real time. Teacher educators at UCF and other universities may change the scenario with little to no cost or wait time. In addition to the plasticity of the simulation, the real power is that, once inside the simulator, teachers tell us over and over again that they see these students as real. In our own work to this point, we find our teachers no longer trying to "write the best lesson plans" but instead trying to reach each and every child in our simulated classroom. We share with our teachers as they enter our virtual environment that our students are consistent each and every day of the week and that the only behavior that teachers can change in this environment is their own.

Description of the Target Group Served by the Program

Developing effective educators is a priority for ensuring that future generations learn successfully in the classroom. Along with educator quality, there is a need to reduce attrition in educator ranks that results from prospective teachers not understanding the learning environment they will be entering. In the traditional teaching environment, we make use of real students to help novice teachers become better educators. In a virtual teaching environment, novice teachers can make mistakes without impacting real students, and they can repeat the experience without the students remembering the initial encounter. The TeachLivE™ Lab currently is used by pre-service and in-service teachers working across content areas. Currently, the system is set up to serve middle school and high school aged students; however, with the dynamic nature of the platform, new characters and age levels easily can be developed. Utah State added to the environment our first student with autism that is assisting teachers in working with this population.

Overview of the Components of the Program

The programs at both UCF and Utah State are delivered via standard Internet connections. Communication of voice and a video view of the teacher's activity is done through a Skype connection, where the interactor is located anywhere in the world, although, at present, that typically means at UCF or at the performer's home somewhere in the Orlando area. The interactor at her station is connected to the virtual classroom site via a standard network connection that supports the TeachLivE's communication of character behaviors and Skype's audio (bidirectional) and video (participant to interactor only); together these provide the illusion of human intelligence being exhibited by the virtual students. The images of the virtual students are seen on a large display, while the teachers in the simulator are not told nor do they see any of the behind-the-scene activities.

The software suite that we developed to provide the simulation and rendering of the TeachLivE™ experience uses the Unity 3D game engine, MorphVOX's voice changer software plus a variety of open-source components in order to provide a system that rapidly will improve based on the efforts of many. We do camera-based tracking at the teacher preparation site using a Kinect™. Besides the tracking, the teacher site just needs a decent workstation with a mid-level graphics card, speakers, a wireless headset, and a reasonably large screen

In its present configuration, the system at the interactor end transmits intended body and facial pose information, head orientation and required animation identifiers to the participant's computer. This interaction, along with the Skype connection, places a demand for the teacher site to have a good Internet connection, which is generally not an issue as most universities have excellent Internet service. The potential limitation that might occur, though, is that network reliability and bandwidth could be limiting issues as the system moves into public schools with limited connectivity, such as some rural schools. The bottleneck here is not the TeachLivE character pose and animation data (these involve very minimal data communication), but rather the usage of Skype to transmit audio in both directions and video in one direction (participant environment to interactor workstation). Those interested in a detailed account of the technology developed by the TeachLivE and SREAL teams can find such information in (Nagendran, Pillat, Kavanaugh, Welch, & Hughes, 2014).

Technical Support Needed to Make Each Technology Format Operational

Typically, in all simulators, there is still a trainer in the loop. At the site where the teacher is training, there is a need for a support person to operate the lab, to connect to the Intearctor, and to potentially debrief (or, as known in the world of simulation, conduct an After-Action-Review). The persons who run the labs at UCF and Utah State are master level teachers who can then work with pre-service or in-service teachers, as needed.

Fortunately, the processes of after-action-review and personal reflection are supported in TeachLivE by an integrated software tool called ReflectLive. This tool provides immediate and automated information about proximity to characters (how much time did I spend with each student?) and talk time (how much time did I talk versus the students talking?). More importantly, ReflectLive also allows the trainer (coach) to annotate frames of a captured performance video, indicating behaviors that need discussion and reflection (either because they are really positive and should be encouraged, or they appear to be non-productive and should be improved). Data captured by ReflectLive can also be exported for analysis, e.g., to be part of an anonymous repository whose data can be mined for patterns that lead to positive or negative outcomes.

APPLICATIONS FOR TEACHING AND LEARNING

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In 2009, USU began to integrate the TeachLivE™ simulation technology into its alternative preparation programs to prepare teachers of students with severe disabilities and teachers of students with mild and moderate disabilities. In both of these programs, teachers spend their days in public schools working with students with disabilities and, in the evening, take classes leading to licensure. The TeachLivE™ lab is used to help teachers refine and practice basic teaching repertoires.

In the program to prepare teachers of students with severe disabilities, the TeachLivE™ lab currently is used to prepare teachers to conduct approach-based reinforcer preference assessments and refine strategies for individualized discrete trial training (DTT). Preference assessments are used to address a common concern for teachers working with students having severe disabilities - insufficient student motivation. The general goal of a preference assessment is to identify powerful reinforcers that may improve student progress. In a preference assessment for students with severe disabilities, the teacher presents a variety of items or activities to a learner and measures the individual's interaction with the various items or activities. During the assessment, patterns emerge, indicating that the individual prefers or interacts with some materials more than others. These desired items and activities then may be used in specific instructional programs to increase a student's motivation to demonstrate desired skills and classroom behavior. One research-based preference assessment procedure is a paired stimulus preference assessment (e.g., Fisher et al., 1992). In a paired stimulus preference assessment, the teacher presents two items to the student and records which item the student approaches. The student then is given access to the item or activity for a short period of time. After every item or activity is paired with every other item or activity, a summary is created by counting the number of times the item was approached and dividing by the number of times the item was available. The result is converted to a percentage and arranged into a hierarchy of preference from high to low percentage (e.g., 100-0% approached).

In the TeachLivE™ lab, teachers practice implementing a paired stimulus preference assessment with "Andre," an avatar who has few verbal skills but indicates his preference by reaching toward an object. Andre also may exhibit a variety of difficult behaviors, including inattentiveness and making strange noises. In the TeachLivE™ lab, a table is placed in front of the screen, and pairs of potential reinforcers (e.g., toys, food, and items used in various activities) are presented to Andre. Andre indicates his preference by reaching toward a particular toy, food, or item. In the TeachLivE™ lab, teachers learn to implement the paired stimulus preference procedure in sessions lasting 2 to 3 minutes. The teachers later are presented with complete data sets in which they determine Andre's preferences for the various items. Importantly, the intensity of Andre's behavior during and across sessions may be varied systematically to help teachers learn to implement the procedure under different conditions. For example, initially, Andre may respond to every request until the teacher demonstrates proficiency with the instructional routine. In subsequent sessions, Andre may look away continually, or make strange noises, or reach for both items on the table, requiring the teacher to prompt his attention. Andre may show these behaviors individually or in combination to create a more complex and increasingly realistic context that requires the teacher to integrate classroom management routines into instruction. The ability to systematically vary Andre's behavior to increase the difficulty of the instructional context is a critical element and advantage of any TeachLivE™ simulation.

The second application used in the program to prepare teachers of students with severe disabilities is discrete trial training. In discrete trial instruction, the teacher presents a stimulus to which the child is expected to respond. Following the child's response, the teacher either reinforces a correct response or implements one or more identified correction procedures. Finally, the teacher briefly pauses before presenting the next trial in the sequence. While this routine may be implemented quickly and simply with a knowledgeable and compliant child, it can become quite complex when the teacher needs to adjust the correction procedure in response to repeated errors or to a child's inattention. In the TeachLivE™ lab, these variables are varied systematically while teachers learn to implement a discrete trial instructional routine. In a recent pilot study, Myers, Reier, and Lignugaris/Kraft (2010) observed two teachers implement discrete trial instruction in an actual classroom. They then implemented discrete trial instruction in the TeachLivE™ lab with an instructional coach and, finally, observed the teachers again following their lab experience. Prior to their lab experience, Teacher 1 implemented none of the discrete trial instructional steps correctly and Teacher 2 implemented 34% of the discrete trial instructional steps correctly in their actual classrooms. Following approximately 40 min of practice in the TeachLivE™ lab with an instructional coach, both teachers implemented the steps in their classrooms with 100% accuracy. If the coach were required to visit each teacher in their schools, the training would have required several hours because of the travel time to schools. While there are several clear limitations in this pilot study (e.g., limited number of participants, instructional targets, and number of data points), the implication of this demonstration is that the TeachLivE™ lab may be an efficient and effective tool for preparing teachers to implement basic instructional routines.

Finally, in our program to prepare teachers for students with mild and moderate disabilities, we have begun to explore the utility of the TeachLivE™ lab for implementing more complex instructional and behavior management routines with as many as four student avatars. Teachers in this program use the TeachLivE™ lab to learn strategies for gaining student attention, introducing a lesson, reviewing classroom rules, maintaining an appropriate lesson pace, strategically providing nonverbal group and verbal individual response opportunities, and using teacher proximity, praise, and extinction to manage the student avatar's problem behaviors. Teachers and their instructional coaches initially work to implement the scripted routines fluently and confidently. As a teacher demonstrates skills under relatively simple conditions, the complexity of the instructional situation may increase along several dimensions, including the complexity of the lesson, the intensity with which individual student avatars demonstrate problem behavior, the number of student avatars exhibiting problem behavior, and the variety of learning or behavioral problems.

The TeachLivE™ lab holds great promise as a tool for preparing new teachers, assessing teachers' instructional and management skills, and providing targeted practice on content-specific instructional and management routines with which teachers are experiencing difficulty in their classrooms. However, there are several limitations of the lab in its present form. In particular, the avatars currently do not have manipulable books, pencils, or papers on their desks so, when those utensils are required, the teachers have to "imagine" that the student avatars are using the designated materials on their desks in a requested manner (the actions, when such materials are associated with an avatar, are generic at present). Importantly, even at this point in the TeachLivE™ lab development, it has clear advantages for preparing teachers. This includes the ability to stop an instructional session, coach the participant teacher, and then resume the instructional session without creating an instructional history with the students. In addition, pre-service teacher colleagues may observe in the classroom and learn from the positive aspects of their peer's instruction and management practice, as well as from their errors of omission (e.g., missed instructional corrections or positive feedback) and errors of commission (e.g., excessive negative statements to students, extended error correction routines, and lengthy procedural explanations).

CONCLUSIONS AND RECOMMENDATIONS

We have concluded with links to allow readers to see video images of the simulator as it is impossible to describe a 3-D environment in a written statement. We believe evidence of this environment's innovation in higher education is both in the press we have received (Inside Higher Education, Sesame Street, MSNBC), in the comments made by our over 12,000 teachers and numerous faculty who have used our simulator, and in colleagues across the country contacting us as to how they can connect with this emerging field of teacher preparation. The best part of bringing any colleague into the simulator is they leave saying "We could make this simulator impact teachers in this area, or that area, or in that way." We believe that the TeachLivE™ Lab is both a useful application for simulation of teaching and a way to change the thought processes of teachers. We see the strongest potential for these emerging environments is the impact we can have on teachers without adversely affecting students and, at the same time, cause teacher learning.

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LIST OF RESOURCES

University of Central Florida TeachLivE website with numerous videos of our work along with our research reports from our research study and proceedings from our annual conferences. http://www.teachlive.org

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Chapter 13

USING SECOND LIFE® TO PREPARE SPECIAL EDUCATION TEACHERS AT A DISTANCE

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PROGRAM DESCRIPTION

For more than a decade, the Department of Special Education at West Virginia University (WVU), a major research and land-grant university in central Appalachia, has offered online graduate certification and degree programs in all specializations in special education, with all courses including live class sessions conducted in real time via various web conferencing tools, in addition to other on demand online activities. Despite the success of these online programs, faculty are always looking for emerging technologies that can enhance the online delivery system and improve the teaching and learning experience for instructors and students.

In recent years, some instructors have begun to use Second Life® (SL), a virtual immersive environment, to conduct live class sessions and other simulation activities in the distance education programs. Although initially intended for role-playing exercises to allow practice in collaboration and co-teaching, the virtual world has now become the primary learning platform for several online courses.

CONTEXT

Second Life® was selected as the virtual immersive environment for the WVU online program because it is can be used on any computer platform, requires no special hardware, and is free to all users. SL has all the essential components needs for successful virtual learning: a three-dimensional (3D) environment, a moveable personal avatar, and text and speech interactions (Cooke-Plagwitz, 2009). It is the most widely used virtual world in higher education (Liu, Kalk, Kinney, & Orr, 2012). SL has been used at universities around the globe within undergraduate and graduate programs in a variety of professional disciplines, including medicine, counseling, and education (Wang & Burton, 2013). Higher education users have created multiple learning activities in SL, including problem-based learning (Beaumont et al., 2014), collaborative learning (Sutcliffe & Alrayes, 2012), role playing exercises (Goa, Noe, & Kohler, 2008), and educational simulations (Weiner, et al., 2010).

TECHNOLOGY FORMATS

Second Life® is an online immersive virtual environment developed by Linden Lab in 2003 that is freely available across the globe. SL uses secure client-server architecture to operate the simulator and viewer as well as manage logins, data, and other functions on a Linux server. Voice interactions are based on Vivox® technology using oRTP (open source Real Time Protocol) and SIP (Session Initiated Protocol) for transmission of voice data. Access to the SL community requires a reliable Internet connection using cable modem or DSL line, a computer with at least 800 GHz of processor speed (1.5 GHz preferred), 512 MB of memory (1 GB referred) and a mid- to high end graphics card, as well as a full-featured web browser. SL currently has millions of users worldwide and has been featured frequently in television shows and other media.

SL contains virtual land, buildings, objects and activities in which people use moveable avatars to interact in real time with other users online at that time (synchronous applications) or to interact with objects or fixed avatars known as "robots" on demand at any time (asynchronous applications). Avatars interact through (a) movements and gestures, (b) text chat, and (c) voice chat. They use touch to interact with objects that can be programmed to perform simple movements; release note cards with information; and display text, images, or presentation slides; as well as link to streaming media files such as QuickTime and collaboration tools such as Googledocs hosted on external servers. Avatars also can use a three-dimensional (3D) modeling tool to build virtual objects using basic shapes (known as primitives or "prims") as well as a scripting language to make objects interactive. They can buy and sell objects or charge for services using a virtual currency, the Linden dollar (L$) purchased using real money or earned through activities online. They can search for, landmark, and transport themselves to other locations within the virtual world.

To use SL, participants download the free SL Viewer application, create an avatar whose appearance can be customized, and create a user name and password to log into the system. There is no change for a basic membership (member status), but participants can also pay for an upgrade to a premium membership (resident status) for $72/year to acquire additional privileges such as owning homes or land, creating permanent complex structures, restricting access to private areas, and immediate access to technical support.

APPLICATIONS FOR TEACHING AND LEARNING

The use of SL as the educational platform for online distance education courses at WVU developed over time. Initially, faculty had to learn how to use SL while also learning how to teach within the virtual world. After the learning activities were developed, and the sessions held within SL were well executed, faculty began focusing on improving the user experience and creating more advanced learning experiences. These stages of development included initial experimentation, improving learning experiences, improving user experience, and advanced instructional experiences.

Initial Experimentation

The use of SL within courses was initially piloted in Spring 2011 with undergraduate students in two campus-based courses. Working with students in a face-to-face setting allowed faculty to see how new SL users learned the system and what problems they experienced before trying to implement the technology with online learners at a distance.

Participants. During the pilot, learning experiences were developed for two undergraduate courses: *SPED 463 Collaboration, Consultation, and Inclusion* and *SPED 364 Educational Programming for Students with Special Needs.* These courses were required courses in the 5-Year Teacher Education Program at WVU, a campus-based program that leads to certification in Elementary Education Grades K-6 plus additional endorsement in Multicategorical Special Education Grades K-Adult; students also earn a Bachelor's degree as well as a Master's degree in Elementary Education. Students in *SPED 463* were seniors in the five-year program, while students in *SPED 364* were sophomores who had not yet been accepted into the program because this course was a prerequisite to entering the program. In all, 54 students participated in SL sessions; however, not all 54 students were in the online sessions simultaneously.

How students learned to use the platform. The use of SL was incorporated into two class sessions for role-playing professional scenarios common within the field of special education. Prior to holding class sessions in SL, the instructor developed some learning activities for students to practice collaboration skills and arranged for SL to be downloaded to the computers in two of the college's computer labs. The instructor reserved 1 hr in the computer lab during per class session in each course to assist students in downloading SL onto their personal computers (if available), creating an avatar, changing the avatar's physical appearance, using different viewing options, gesturing, and navigating the avatar within SL. Faculty visited other university's campuses within SL and selected universities with publicly available spaces where class sessions could be held.

Class sessions. For the first class session conducted in SL, students met virtually in a pre-designated, public university location within SL during regular class hours. The session began with the instructor taking attendance and then describing the plan for the session. The instructor demonstrated how students would participate and modeled how to manipulate the avatar, as needed, organized students into groups, then distributed a role play scenario to group leaders through SL's text chat. Text chat is a feature that allows users to type information to an individual or group in real time. Once the group leader received the scenario through chat text, the groups were asked to relocate to a different area to choose roles and practice their role-play. Students were encouraged to use the "mouse view" in SL so that they could see each group member's facial expressions. Mouse view is a feature that allows users to zoom in on an object or avatar to view it more closely. After students practiced their role-plays, they met back in a large conference area to share the outcomes and act out the role-play for the whole class. Following the first class session, students wrote reflections of their experience, expressing both their excitement about the virtual learning experience and their reservations about its application in teacher education courses.

Prior to the second session, faculty attended professional development activities involving use of SL in education and reflected upon the experiences with the first session. Student feedback suggested they were confused about how the role-plays were connected to the course content. Consequently, at the start of the second session, the instructor explicitly reviewed learning objectives and provided them in writing for students to review. Assignment boxes containing needed materials were also created to ease the instructional flow. Instead of sending individual instant messages with the materials to students through text chat, the instructor directed students to open the boxes placed earlier in the area to access materials independently and quickly. Other student feedback indicated they were concerned about not having lecture about the content in the first session; therefore, the second session included a mini-lecture with display boards and presentation slides (i.e. PowerPoint, Keynote) in SL. Display boards are objects much like a projector screen where presentation slides were uploaded for students to view. During the lecture, students participated in an activity creating shared norms for their groups in which they were asked to establish each member's role in the group, the behavioral expectations for the group, how and when individuals would communicate, and how they would solve problems as they arose. After the mini-lecture, students again role-played scenarios created by the instructor. Student feedback after the second class session indicated that the students liked the new formats and felt more comfortable learning in SL.

After this successful initial piloting of SL, faculty were interested in seeing whether and how the virtual world could be used in distance education courses. Faculty created a simple set of instructions for how to download SL and how to navigate within world, and provided these instructions to volunteers in the online graduate program. Graduate students then met faculty in world outside of class time and proved that the skills needed to access SL could be acquired by students at a distance without face-to-face oversight by the instructor. After these initial experiences in piloting SL with students in a distance education program, faculty increased the use of SL in distance education courses, and worked toward improving learning experiences.

Improving Learning Experiences

The use of SL as the educational platform in distance education courses began in Fall 2011 with two sections of one core course in the online graduate programs in special education, *SPED 66, Consultation, Collaboration, and Inclusion*. Students taking this course were in one of four graduate programs: (a) Multicategorical Special Education, (b) Autism Spectrum Disorders, (c) Gifted Education, or (d) Low Vision/Blindness

Participants. The focus on improving learning activities occurred during Fall 2011 through Fall 2012. The number of students using SL changed by course enrollment each semester, but included 104 students, with 44 students in Fall 2011, 34 students in Spring 2012, and 26 students in Fall 2012. Since the participants were students in distance education courses, faculty needed to support students in learning how to use SL without face-to-face instruction.

How students learned to use the platform. Since these distance learners would need to learn to use the system somewhat independently, the most experienced faculty member created a handbook to assist students in learning how to use SL. Prior to the first class session in SL, the instructor provided students with a PDF file of the handbook through the online learning management system, and asked students to follow the steps to learn how to use SL independently of class time. The handbook featured a table of contents for each skill and included initial skills (downloading SL and creating an avatar) as well as skills needed for class sessions (e.g., teleporting to a new location, using the speak key). The List of Resources section at the end of this chapter includes a link to the student handbook. While students learned how to use SL independently, many supports were created to lessen the learning curve of using SL as the educational platform for courses. Support during class sessions included increasing presence within the learning environment through designing more realistic learning spaces and creating scaffolds within learning activities.

Class sessions. While faculty initially piloted the use of SL on the campuses of other universities, at this time, faculty began to explore use of dedicated space within the virtual world. First, they gained access to the private island within SL owned by the WVU College of Education and Human Services. A private island in SL is much like an island in real life in that it is a piece of land surrounded by water. Having access to private property within SL increased the level of control faculty had in creating the learning environment and developing learning activities. Therefore, during this phase, faculty worked to improve the learning experiences for students through both the learning environment and the learning activities.

Learning environment. At the time, another faculty member within the college managed the College's island within SL. Since the island was private, students needed an invitation to have access to the island, as well as a landmark to teleport to the location. The island had a conference building, and faculty began to use this space for holding classes after the initial pilot. As the island was private and had another faculty member as an administrator, faculty would provide the administrator with the students' avatar usernames to have invitations sent to students to join the island. There were several problems with this system of inviting students. Initially, students created their avatar in advance and sent the username to faculty; then, faculty created an assignment for students to submit their avatar's username so that the instructor could create a list of usernames for the island administrator to add as members. The problem with this system was that some students did not create an avatar when they sent the username and submitted any username for points; when the administrator searched for the username to add the student as a member, the username was not the student's avatar. Another problem with the system involved students having difficulty locating and responding to the invitation. Once the invitation was sent, a notification appeared in the upper right hand corner of the student's screen; however, if the user did not accept it immediately, it would go into a folder where the user would have to find it. This would not be an issue for an experienced user; however, most students were new to SL and struggled to find the invitation. If invitations were sent while students were not logged into SL, it would appear momentarily when they logged on and then disappear into a folder. To eradicate this problem, faculty decided to have invitations to the island given during live time on the first night's class session. Faculty met students and the college's island administrator at SPED Retreat (a private space in SL with searchable coordinates owned by department faculty) to send the invitation, assist students with accepting the invitation and purchasing the landmark (for free), and guide students in teleporting to the island. After students teleported to the college island, faculty met the students and held the first class session. Meeting the students during live time to assist them in accepting the group invitation decreased the amount of stress students experienced when initially learning to use SL as the course platform.

The learning environment also was improved through the design of learning spaces within the college's island. The conference building was not conducive to some activities faculty wanted to do within SL; therefore, faculty worked to learn how to build within SL. The most experienced faculty member experimented with building boxes, then increasing the size of boxes to create classrooms. Through trial and error, faculty learned many lessons about building. One important lesson was that, if the delete button were accidentally selected, everything that was built and connected to the object would disappear without the option for recovery. Another lesson learned involved textures. which are used to change the way an object looks. For example, if a box was built, one could add a brick texture to make the box look like it was covered in bricks. When faculty initially practiced building, large buildings were built, but when textures were added the buildings did not look realistic because the textures were out of proportion due to the size of the buildings; therefore, faculty created multiple boxes and linked them together so that the size of the walls were smaller and the textures would look proportionate. Faculty built a main classroom for large group instruction and small group buildings for group activities. The buildings were designed to resemble the type of architecture on the university's campus in real life. As faculty had no background in computer graphics or design, the buildings were not replications of the existing campus structures; however, they resembled the architectural style of the campus. The buildings' interior spaces were designed with windows so that the space would feel open while avatars were inside. In addition, the learning spaces were designed to support learning activities; therefore, since classes included interactive lecture and collaborative group work, buildings were designed to facilitate these activities. The main classroom, where students met for interactive lecture, included an area with display boards to show presentation slides of content for discussion. Small group buildings were created for students to work collaboratively in groups. These buildings included a table with chairs for formal group work, as well as an area with informal seating.

Learning activities. In addition to changes within the learning environment, faculty also experimented with learning activities during this phase, including: student-led role-play scenarios, co-taught lessons led by students using different models of co-teaching, professional development sessions designed and delivered by students, and the use of other technologies within the virtual world. These other technologies included use of Google Docs to allow students to collaboratively create permanent products and incorporation of slide presentations, websites, virtual manipulatives, and videos on You Tube for students to view while in-world. Initially, faculty experimented with the use of other technologies during class sessions; however, faculty found that this experimentation caused the students stress since they were learning how to use the environment while faculty was experimenting with new ways to use it. Therefore, faculty stopped using class sessions for experimenting with new technologies, and instead experimented independently of class time with volunteers. During this phase, faculty also learned to make transitions from one activity to another explicit; therefore, instead of only providing verbal directions, faculty provided directions on display boards to ease the confusion during transitions.

Improving User Experience

In Spring 2013, faculty began using a routine in the class procedures to alleviate some potential feelings of uneasiness that accompanied learning a new technology. This allowed students who were feeling uneasy about learning a new technology to at least feel comfortable knowing what was going to come next in the class routine because they were familiar with the procedures of the class. At the initial class session, the instructor provided students with an orientation to the college's private island and explicitly taught the class routines. The instructor then followed the same routine for all class sessions: activator/warm-up activity, review of the activator, 10-15 min of interactive lecture, individual activity, 10-15 min of interactive lecture, group activity, and debriefing of group activity. These changes dramatically increased students' feeling of comfort and ease with learning the technology as was evident from course evaluations of instruction.

In addition to improving student experience through the organization of the class routine, the instructor also began troubleshooting typical technology problems and was able to assist students when such issues arose. As time passed, faculty became very experienced in how to assist students with technology issues through the use of Google. Faculty searched for the problem the student was having and found the answer to assist the student in solving the problem. Assisting students with technology issues increased the level of support students felt, which improved students' positive perception of using the virtual reality application.

Faculty also worked to improve students' experience by maintaining a Second Life® blog. The blog was created to show edited video clips of sample activities within SL; however, faculty also began posting student-created videos (with permission) of students demonstrating the skills needed to complete the SL assignments. The SL assignments are assignments where students demonstrate skills needed to participate in class sessions within SL. The blog also included video testimonials from students about their experiences using SL.

Faculty also tried to improve students' experience of using SL by updating the SL handbook, and streamlining the process of obtaining access to the island. Faculty revised the first assignment to require students to submit a screenshot of their avatar with their avatar's username above their head. This screenshot ensured that the student created the avatar, and faculty could see the username to send the student an invitation to the island and a landmark so that the student could teleport to the island once the invitation was accepted. To remove the need for assistance while accepting the invitation, faculty created screenshots and written directions for how to accept the invitation and how to teleport to the island. To leave more time for content-based activities during the first class session, faculty created an independent scavenger hunt for orienting students to the island instead of using class time for the orientation.

During this phase, faculty also trained other regular and adjunct instructors on how to use SL as the platform for courses, and created a handbook to assist them. The most experienced faculty member initially created a workshop to train faculty in a face-to-face environment over the course of a week for a total of 10 hrs; however, to see if this time could be shortened and if the face-to-face component could be removed, the next workshop was reduced to four hrs of face-to-face training, and the following trainings were reduced to two hrs without the face-to-face component and meeting within SL instead. The part of the session where participants met during live time included using that time for individuals to ask questions and practice skills that one experienced trouble with when experimenting with using SL. Learning spaces were designed for other faculty members who were using the college's island for courses, a second campus was added, and transportation was created to move between the two campuses within the island. In real life, the university has two campuses and many students use the Personal Rapid Transit (PRT) system to commute between campuses; therefore, on the SL island a PRT was built to virtually teleport students between the campuses.

Advanced Instructional Experiences

Improvements in user experience increased faculty knowledge of how to use SL, how to fix problems that arose, and how to find answers to problems that students and other faculty experienced while using SL. This increase in knowledge led the most experienced faculty member to create more advanced instructional experiences. One instructional experience included the addition of a virtual primary school on the island for learning activities. One learning activity within the primary school involved classroom configuration and arranging the learning environment to promote student engagement, as well as support various instructional arrangements. Students were provided with a room full of furniture, a scenario, and the task to rearrange the furniture based upon the scenario, using resources to support their decisions. Another learning activity within the primary school involved practicing the use of evidenced-based instructional strategies to teach mathematics to student bots in the resource room. Student bots were built and scripted to respond to keywords in chat text, using scripts that were already created by other SL users, free to other users, and found through a Google search. Since the bots responded to text chat, the students typed their conversation instead of speaking with the bots. The bots were programmed to answer incorrectly so that students could practice analyzing errors, then select instructional strategies based upon the types of errors the bots made. Another learning experience within the primary school involved analyzing the arrangement of furniture within classrooms to determine the model of co-teaching being used within each classroom. During this activity, students moved their avatars between classrooms within the primary school to determine the model of co-teaching used, based upon how the room was configured. Finally, other activities within the primary school involved classroom parity in a co-taught classroom. Students analyzed the classroom to determine how to increase the level of parity within it, and then completed an activity concerning student behavior and seating arrangements.

CONCLUSONS AND RECOMMENDATIONS

Multiple faculty members at WVU now have successfully used the Second Life® virtual world as a delivery format for live online class sessions with distance learners enrolled in several different online graduate courses at a distance. Both beginning and experienced students have learned to use the virtual work successfully.

Suggestions for using a virtual immersive environment for online courses include:

- Start simple and progress slowly so instructor and students gradually become more skilled and gain greater confidence in their ability to interact in S;
- Begin by downloading the free SL viewer, creating a free avatar, and exploring this virtual world to learn, especially sites focused on education, to get a broad sense of the kinds of settings and activities that can be created in world;
- Increase your skills for using SL by viewing the multitude of free and easy-to-follow tutorials available online in You Tube or purchasing books for SL beginners available through Amazon;
- For an inexpensive personal space to create and conduct learning activities, pay a small amount for a premium avatar, which comes with a private house as well as build privileges, then use this space to design and conduct your own group activities involving 10-15 people for use in courses;
- Get colleagues or student assistants to help you practice activities BEFORE you use them with students so you can resolve problems in advance;
- For activities unique to your course or program, prepare simple-to-understand and easy-to-follow directions with screen shots to guide students through activities;
- Read the professional literature on applications of SL for college and university courses to gain new ideas on creative uses of SL for

teaching and learning in journals and conference proceedings that focus on technology applications in education; and

- Share your work with others through presentations and publications – everyone is looking for interesting contexts and activities to use in their own courses.

Future Directions

WVU's most recent project is experimenting with using Oculus Rift 3D viewers for a more immersive experience during educational simulations within SL. During 2015-2016, undergraduate students in campus-based courses will use the 3D viewers in simulations involving transition planning. Depending on the findings of the pilot project and pending release of a less-expensive, consumer version of the glasses, faculty may begin experimenting with them in distance education courses in the near future.

Faculty members are also working on finding ways to make the bots provide a more realistic learning experience. They are researching how to scripts bots using voice command rather than text chat, since student bots programmed to respond to voice would more closely simulate classroom experiences in real life. They also are looking for ways to enable the bots to respond with speech instead of text, since student bots that speak and respond to spoken communications would offer a more realistic portrayal of s real world classroom.

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LIST OF RESOURCES

Second Life®: http://secondlife.com
You Tube Tutorials for Second Life®:
https://www.youtube.com/watch?v=y6CLvMBZcuw
Second Life® for Dummies: http://www.amazon.com/Second-Life-Dummies-Sarah-Robbins/dp/0470180250
Second Life®: The Official Guide: http://www.amazon.com/Second-Life-The-Official-Guide/dp/047009608X
Second Life® Education Sites: http://secondlife.com/destinations/learning
EdITLiB List of technology in Education Journals:
https://www.editlib.org/journals/
Second Life at WVU Student Handbook:
https://drive.google.com/file/d/0B_iZGKQ6INBxS3hYTHlNbTR3THc/view?pli=1
Second Life at WVU Blog with Video Clips of Instructional Use:
http://drhartleywvu-slvideos.blogspot.com/
Oculus Rift 3D Glasses: https://www.oculus.com/en-us/rift/

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