Distance Learning and the Visually Impaired: A Success Story

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This article describes a U.S. Department of Education grant funded project to develop and deliver a distance master's degree program in blindness and visual impairment to students in the 14 states of the Western Governor's Region. A small proportion of the students in the program are, themselves, blind or visually impaired. The article shares challenges, insights, and practitioner perspectives from the technological, design, and subject matter experts.

> Let us think of education as the means of developing our greatest abilities, because in each of us there is a private hope and dream which, fulfilled, can be translated into benefit for everyone and a greater strength for our nation.—John F. Kennedy

While the blind and visually impaired (BVI) do not represent a large portion of the disabled in our society, they do represent a group that is uniquely disadvantaged by contemporary distance learning technologies, which tend to rely heavily on visual perception (e.g., video teleconferencing, World Wide Web (WWW), CD-ROM). This, coupled with a documented lack of qualified instructors for all special education children (Ingersoll, 1999), was the impetus for the development of a distance learning master's degree program in BVI. In January 1998, the US Department of Education funded a three-year grant project (Federal Grant #H029A70113) for the University of Northern Colorado (UNC) to design and deliver such a graduate degree program to the 14-state Western Governor's Region (Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, North Dakota, Oregon, South Dakota, Utah, Washington, and Wyoming). This article provides details of the grant project, instructional design and program development issues, delivery systems and media selection, and lessons learned. It offers practitioner, development, and pedagogical perspectives related to the creation of distance learning environments that are stimulating, effective learning environments for the sighted and the nonsighted learner.

Project Description

The $1.2 million grant project currently offers courses to over 70 students working to complete 47 to 62 semester hours of coursework for their Master's degree in Special Education (Severe Needs: Vision). These students are geographically distributed across the Western Governor's Region (WGR) and a handful of midwestern and southern states. The first classes were delivered in fall 1998. Eleven courses have been converted for distance delivery as part of this project and five remain. In fall 1999, seven courses were delivered with a total of 73 students registered. Final courses for this cohort of students will be delivered in fall 2000, since the grant term ends in December, 2000.

Four project objectives were stipulated at the outset: (a) to provide faculty support (one semester

course release) in the conversion of course offerings to formats suitable for the WWW, compressed video, broadcast, and other distance technologies; (b) to investigate the program's participation in the Western Governor's University; (c) to provide financial support for the costs of course transmission and delivery to Western Governor's states and to allow for field-testing and evaluation of the distance delivery model; and (d) to provide financial support to students and professionals from the WGR states.

To date, six faculty members in special education have been released from a one-class teaching assignment for a semester to work closely with the instructional design and development staff in the redesign of their courses for distance delivery. An additional outcome of this project is the development and use of a standardized preplanning manual and course conversion manual to facilitate and manage the redesign efforts. All faculty members deliver their distance courses during the next semester. While there have been some attempts to investigate the possibility of expanding the reach of this project through the Western Governor's University, the logistical, administrative, and policy barriers have been substantial. At this time, the grant project described herein is completely administered by the Division of Special Education at the University of Northern Colorado.

Students admitted to this distance delivered master's program receive full tuition and fees scholarships from grant funds. Discussion concerning the issues of accessibility to distance delivery systems and equity of access for all learners have been ongoing among practicing professionals for some time, related to the preparation of special educators. This project was funded as an exploration of these issues, and the tuition scholarships were implemented as an initial marketing and recruiting tool for this experimental effort. Typically, about 2% of the students in this degree program at UNC are blind or significantly visually impaired. The distance cohort of students is not unique in that respect. Two distance students are blind, and two require specific adaptive technologies to access text.

The special education faculty at UNC have a deeply held philosophy about this severe needs program. It was agreed early on that the distance delivered program would subscribe to the same philosophy, and this philosophy has influenced many design and implementation decisions. The philosophy statement is as follows:

> The UNC Severe Needs: Vision, program is based on a firm and continuing commitment to the rights of all students with visual and other disabilities to receive equal educational opportunities, including equal access to the curriculum. The faculty believes that each learner should be provided educational opportunities that maximize potential for whatever level of independence is possible in order to be productive in society and to live a meaningful and fulfilling life.

While it may be more difficult for the not-sighted person to take advantage of today's visual distance environments, this project demonstrates that many strategies can be incorporated within distance learning environments to leverage the communication potential of these delivery technologies. A focus on collaboration, sharing, and contextualized experiences allows not just "teaching-by-telling, but learning-by-doing" (Stanard, 1999, p. 49). As each of these students has advanced with the content of their discipline, they have also advanced with the constructivist experience of actually using the technologies for learning that they will use to teach children who are blind or visually impaired.

This project is one example of Molly Broad's comments about virtual learning:

…fundamental importance of high-quality faculty and effective interaction, both between faculty and students and among students. Faculty rightly believe these are fundamental to good education; however, with the growing array of technology tools, it is possible to achieve those objectives online. In addition, virtual learning can also bring a very rich array of academic resources to the learning process—resources that address the multiple learning styles of students, and resources that greatly enrich the educational materials available to students. (Morrison, 1998, p. 3)

The scope of this degree program now encompasses multiple distance delivery technologies (audio conferencing, compressed video, CD-ROM, audio tape, custom videotape, WWW, and synchronous and asynchronous discussion) and capitalizes on unique capabilities of many media (video, text, audio). Of critical importance, is that there are not two separate but equal learning environments (for the sighted and the not-sighted). All students have access to and use the same materials and technologies. The creation of such an environment has been the constant challenge and commitment of this grant effort.

Students come to the campus at UNC for a single 2-week requirement during a summer of their program. During this 2-week period, they receive individualized training in orientation and mobility (use of the white cane) and hands-on training with specialized adaptive equipment (e.g., braille keyboards, embossers, enlargers). Otherwise, their entire master's experience is that of a virtual learner, separated from their instructors and peers by time and distance.

Successful distance education efforts of this magnitude require the collaboration of a variety of specializations. A very special collaboration between the Division of Special Education and the Department of Educational Technology has developed as a result of this grant effort. Program management, facility design, faculty assignments, scheduling, graduate student assistance, logistics, and professional development are examples of the areas requiring cooperation. The project team consists of

Dr. Kay A. Ferrell, project director and Special Education Division director.

Chuck Wright, project coordinator and special education faculty.

Dr. Kay A. Persichitte, instructional design and distance delivery consultant, and Educational Technology department chair.

At least five other special education faculty.

Educational technology graduate assistants [Nathan Lowell and Stephanie Roberts].

Dr. Ferrell, Mr. Wright, and the other special education faculty have provided the subject matter expertise for the course redesign and have delivered these courses as distance courses utilizing multiple delivery tools. Dr. Persichitte and the educational technology graduate assistants have provided the technical and design expertise for the redesign of the courses. They have also built the custom-created materials and online environments characterizing this distance program.

This master's program is one of several graduate programs offered in specialty areas of special education at UNC within the College of Education. The focus of these graduate programs is the preparation of advanced education professionals for K-12, higher education, and adult learner settings. Students in the distance cohort register (online or through an 800 toll-free phone line) for as many semester hours as recommended by their academic advisor. Less than a handful of

this cohort are full-time students. By large majority, they are currently teaching in special education K-12 classrooms and are seeking an avenue to improve their practice and advance their professional credentials without leaving the children that need them. A small number are teacher aids in special education classrooms or teachers in regular K-12 classrooms.

Design and Development Issues

Instructional design (ID) issues that have influenced the project cut across a broad range of technical, pedagogical, and instructional concerns. This master's program requires the alignment of course content with four sets of professional standards. Connecting the course objectives, activities, and student assessment to these standards was a constant challenge. Special Education faculty reviewed course objectives for overlap and update as part of the redesign effort.

Faculty had not been previously introduced to the concept of (or the importance of) a systematic process for the design of instruction. The introduction and implementation of a basic ID process grounded the development of the distance degree program and the individual courses. The model chosen for its simplicity and overall functionality was the ADDIE model: Analysis, Design, Development, Implementation, Evaluation. Repeatedly, concerns related to the learner analyses influenced decisions made in each of the other phases. For example, originally the degree was to be delivered primarily via compressed video technology. However, as was noted, because of the geographical diversity and the distance many students lived from a compressed video site, major changes were repeatedly made in the selection of the delivery media. As the project progressed and the special education faculty became more comfortable with the process, the phases began to overlap, and design decisions often impacted several phases simultaneously. For instance, the decision to select a particular media often caused revisions to instructional strategies, required student activities, and student assessment.

The conversion of traditional face-to-face courses to a distance format is a complex task for faculty unfamiliar with the theoretical foundations of distance learning and the capabilities and limitations of the increasing variety of distance technologies. This seemed most obvious as we worked with special education faculty to rethink traditional instructional strategies that were ineffective or inappropriate for a distance setting. In particular, replacing the traditional graduate course discussion format with similar opportunities mediated by an electronic technology was a challenge initially for the faculty and for the learners. Faculty tend to make naive assumptions about the ease of converting their pedagogical methods to distance environments.

The actual selection of distance delivery systems and media that meet both the needs and accessibility of the students, faculty, and content is a constant challenge. Particular effort was made not to match the content and learner needs to the technology, but vice versa. This issue is also complicated by the capability and limitations of the technology itself to be adapted for access by the blind and visually impaired (e.g., use of tables in a Website). Keeping the focus on content and learners throughout the ADDIE process was sometimes a strain, as either special education faculty or educational technology staff came across new "bells and whistles." We eventually developed a system that allowed us to test and evaluate new technological tools in another distance environment before incorporating them within the distance master's program, where the learners would serve as unwitting guinea pigs.

An overarching concern for the development of all the instructional materials was the special needs of the learners with visual impairments. If we could not find a way to use the same

technology for all the students, we searched for an alternative (e.g., the use of "alt" tags on the Website to provide descriptions of all graphics, the use of PDF files to be downloaded as braille).

One unanticipated issue that arose early was discipline faculty preparation to teach in these mediated instructional environments. Much more scaffolding and assistance was required than originally anticipated. Most faculty required nearly a semester to get comfortable with their new distance learning environments and felt that without the continuous support of the Educational Technology staff, they would have been unsuccessful and unmotivated to continue with the distance delivery effort. This was the case in spite of the close working relationship between special education and educational technology throughout the analysis, design, and development phases. Even the faculty who were quite "computer literate" struggled with distance delivery of instruction through at least the first experience.

As most disciplines and many states move to a standards- and performance-based model of education, we focused the design of courses on similarly sculpted student assessments and evaluations. This, too, proved to be a considerable challenge for the discipline faculty accustomed to much more traditional types of student evaluation—for example, online responses to questions for case studies as a replacement for a class discussion of the correlated text chapter(s).

The creation of many support materials was critical to the distance students feeling secure and connected to their graduate program. Student and faculty support materials included a student handbook (available as text, PDF, online), custom course design guidebook, CD-ROM for project demonstration, staff trained to handle the 800 phone line, and recruitment brochures for the next cohort.

Other issues that have surfaced are related to the administration and implementation of distance learning programs. Faculty and student access to distance technologies is not yet ubiquitous for infrastructure (e.g., compressed video access, modem connect speeds), hardware (e.g., adequate RAM, monitors set for number of colors), or software (e.g., Web browsers, adaptive applications). This project has been repeatedly challenged to adapt or work around the technologies. We suspect that this will continue to plague other such efforts, but with unique challenges as the telecommunications and computer technologies continue to evolve.

This project would not have succeeded without the strong administrative support from the College of Education Dean. The scope of the effort (e.g., full graduate degree program, curriculum revisions, calculation of faculty productivity, facility space) and the variety of student systems (e.g., registration, graduate school, library, bookstore) that were involved demanded the consent and support of upper administration. The project management requirements of this grant were underestimated. Timelines, coordination, and collaboration became the foundation of the project after the first year, but were expected to decrease at that time. The degree program is complex, due to state licensure requirements and practicum experiences. The participation of non-special education faculty (faculty from supporting disciplines) required additional time, as did other campus support systems (e.g., technical, financial aid) that were not yet prepared for a distance education project of this scope.

The College of Education had no distance delivery classroom at the time the grant was funded, thus requiring facility design before the grant project could begin. A distance delivery classroom was created (WWW access stations; computer conferencing; digital video development station; compressed video classroom) with private donor funds from the Division of Special Education.

This is another example of the strong collaboration between Special Education and Educational Technology divisions.

Technical considerations at the development level and the end user level (e.g., Website compatibility with screen readers, software versions, Web browsers and their configuration; software downloads) are a continuous concern. The graduate assistants share responsibility for monitoring all non-course interactions (e.g., program listservs, Student Union chat areas) and responding to requests for technical assistance.

Delivery Systems and Media

The project purposefully employs a wide variety of distance delivery systems and media. In particular instances, materials have been developed in more than one media to allow all students (sighted and nonsighted) access. Though not a stated objective of the project, an unintended consequence has been that the students are increasing their use of and comfort with technology, in general. All members of the project team believe in the power of technology to meet learner needs and in the importance of better preparing teachers to effectively utilize technology with their students. For these students who will teach children who are BVI, Hardman's (1999) comment strikes a loud chord, "A technologically competent work force in the education industry is needed to continue to keep the promise of universal education: to leave behind no child who is willing to try" (p. 4). The project relies on the WWW [http://vision.unco.edu], compressed video, text (student handbooks and coursepacks), videotape (custom and commercial), CD-ROM (custom), a required campus component during one summer, computer video conferencing, synchronous and asynchronous communication via the Web, audioconferencing, and commercial satellite downlinks. All text-based materials are also available on the Website, some as linked documents and many as downloadable PDF files.

The discipline faculty felt strongly that the distance delivered program should be as student-centered as the campus program. The design and development process has consistently incorporated Sorg and Truman's (1997) recommendations for creating quality student-centered virtual classes. Their recommendations included personalizing instruction, humanizing the course pages, providing advance organizers, and assuring easy navigation between and among course topics.

Courses delivered to date include the following:

EDSE 540 Independent Living for Individuals with Visual Disabilities

EDSE 542 Assessment and Methods for Teaching Students with Visual/Multiple Disabilities

EDSE 543 Braille Codes and Formats

EDSE 543B Braille Codes and Formats, Part II

EDSE 544 Technology for Students with Visual Disabilities

EDSE 546 Principles of Orientation and Mobility

EDSE 641 Medical and Educational Implications of Visual Handicaps

EDSE 642 Advanced Seminar in Education of Students with Visual Handicaps

EDSE 643 Psychosocial Needs of Individuals with Visual Handicaps

Though multiple media and distance systems are used to deliver this program, the WWW has been chosen as a central learner and instructional resource for the redesign of each course (http://vision.unco.edu). Student information and access to project support are available to the public, but all courses are password protected for purposes of copyright and intellectual property. A standardized navigation shell was custom created so students do not feel "lost" each time they begin a new course in their program. An example of the course navigation structure and a typical course homepage can be viewed at EDSE 542.

Each course, however, relies to a varying degree on the Web for the delivery of instruction. All courses have embedded syllabi, links to the four sets of discipline standards and course standards, course requirements, description of course activities, an asynchronous threaded discussion area, course schedule, and a place for additional resources that may or may not be Web-based. Each course also has a dedicated class listserv. Some of the course Websites include interactive custom-designed tutorials, synchronous discussion areas, samples of student projects, links to external assistive software, and multimedia authored graphics. The variety of technologies in use has increased as the discipline faculty have become more comfortable with trying new instructional strategies with remote students.

Remote students have access to several support systems that have proven invaluable to the satisfaction and success of the learners. As the distance learning environment becomes more complex, the importance of faculty and student support materials and easy access to the materials increases. These options provide support to the distant learners:

· Student handbook for project participants.

· Toll-free phone into the Special Education Division office.

· A Webmaster who responds to individual technical problems with near 24/7 response.

· CD-ROM with Web browser and style sheet options to load on home computers.

· Grant project listserv (subscribers include students, Special Education faculty, and the grant team).

· Distance education faculty discussion area.

Lessons Learned

This project has been a tremendous effort that has resulted in the preparation of a large cohort of special educators dedicated to the needs of the blind and visually impaired. Though not perfect, we offer these lessons learned.

Facility design (FD) of distance education learning environments (DELEs) is expensive, time consuming, and requires substantial technical, pedagogical, and academic expertise related to distance delivery of instruction. The identification of a team of experts will result in savings of time and funds if implementation is pending.

ID and FD need to evolve simultaneously for DELEs that utilize multiple delivery systems and media. This is particularly important in today's high tech development era in which the infrastructure, hardware, and software change rapidly.

Substantial advance planning and continual project management are critical to initiatives of this scope. The success of this project is largely due to the human resources; the expertise, the support, the management, the supervision, the recruiting of qualified personnel.

Most of the distance delivery technologies today are visual technologies; consequently, there is significant attention required to specialized design and development considerations for this project and for any other distance effort that strives for equal access for disabled learners. Distance education environments should not perpetuate the long-held erroneous assumptions about people with disabilities and their access to technology. The concepts of "separate but equal" and "reasonable accommodation" are not the pinnacle of equity.

Faculty introduction to and training for using distance delivery technologies for instructional purposes is particularly important to project success, learner satisfaction, and continued faculty involvement. A special online discussion area has been created to facilitate faculty discussion of distance education issues. Feel free to visit our [Distance Education Faculty Lounge](#) and participate in either the Aspen Room (a synchronous discussion area) or the Discussion board (a threaded discussion area).

Meeting individual learner needs, faculty expectations, and content requirements are not mutually exclusive in the creation of a DELE, but the process is extremely complex. Grounding the process in the fundamentals of instructional design is imperative. Attention to the implementation of formative and summative evaluation is also important.

Summary

In summary, the effort over the last 2 ½ years to build a distance delivered degree program from scratch has required substantial investments in human resources, technical resources, facility design, infrastructure development, faculty professional development, and instructional design support. As we move to the final stages of the grant term, two things are obvious. First, the project is sustainable based on anticipated student participation, College of Education administrative support, and faculty motivation. Second, the accessibility and development issues that were the focus of the project through the first 2 years now have fallen to lower priority, though they are continually reviewed and revised. The students, faculty members, and design team are now clearly focused on issues related to the improvement of instructional interactions/activities and the development of learner community within these DELEs. Using the DELE to support social equity for the disable learner is now a focus. From all perspectives, this project is labeled a success.

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