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ABSTRACT

As the population of minority pupils continues to increase, the need for special education personnel to identify and educate culturally and linguistically diverse exceptional students will also rise. Continuing shortages of qualified personnel in special education have been declared a national emergency, with "diagnostic staff" ranked as the fourth highest area of need. Shortages are particularly severe along the Texas-Mexico border, where a 1997 needs assessment predicted a need for 41 diagnosticians, preferably bilingual, within the ensuing 5 years. This paper describes initial steps in the development of Project DEED (Distance Education for Educational Diagnosticians), a federally funded distance learning program to provide courses in special educational diagnostics to rural border communities far from higher education institutions. The closing of one of the four university-based special education programs in the south Texas border corridor exacerbated an already serious situation. At about the same time, T-1 fiber optic telephone lines were extended to all rural schools in the area. This, coupled with other technological advances, made it feasible to offer multimedia-based presentations accompanied by videoconferencing. Steps in program development included choosing software, establishing 8-10 distal sites, acquiring sufficient space to accommodate hardware and work space, building technological infrastructure, developing staff within a team approach model, keeping costs down, and selecting each distal-based cohort. Contains 26 references. (SV)

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USE OF SELECTED AVAILABLE TECHNOLOGY TO PROVIDE RELATIVELY INEXPENSIVE DISTANCE LEARNING COURSES ALONG THE TEXAS/MEXICO "BORDER CORRIDOR"

Previous concern for over-representation of minority pupils in special education classes has resulted in an emerging body of literature advocating special education programming that is sensitive to the needs of children who are culturally and linguistically diverse (e.g., Baca & Cervantes, 1997; Baca & Amato, 1989; Figueroa, 1989, 1990; Rueda, 1989). Among the factors that have exacerbated this problem are: (a) Bilingual/bicultural differences of Hispanic children from their mainstream cohorts (Baca & Chinn, 1982; Cummins, 1984); (B) lack of bilingual and/or Hispanic professionals (Brown & Minke, 1986; Fagan, 1988); (c) generally high attrition rates for minorities in undergraduate and graduate education programs (Howard, Pion, Gottfresson, Flattau, Oskamp, Pfafflin, Bray, & Burstein, 1986); and (d) lack of adequate
bilingual programming for handicapped Hispanic children (Baca & Cervantes, 1997).

As the population of minority pupils in our schools continues to increase (predicted by Chapa, 1990, and others), the need for special education personnel to identify and educate culturally and linguistically diverse exceptional (CLDE) students will also continue in direct proportion to student numbers. Indeed, continuing shortages of qualified personnel in special education have been declared a national emergency (American Association on Mental Retardation, 1989) and have been well documented in all areas of special education (Simpson, Whelan, & Zabel, 1993). In the early to mid-90s, the National Clearinghouse for Professionals in Special Education (1992) ranked "diagnostic staff" as fourth highest area of greatest need; the U.S. Department of Education (1996) continued to document this severe deficiency.

Texas, a state with a diverse populace and economy has the second largest Hispanic population (19%) in the nation. At its southern border, Mexico borders nearly nine hundred miles and provides a richness of culture and history referred to as the "Border Corridor." Unfortunately, a variety of factors, including geographical isolation, ruralness, ranching or agricultural based economy and overall poverty level combined with the mingling of the depressed economies of South Texas and Northeastern Mexico, tend to negatively influence the long-term availability of qualified educational personnel. Although the Hispanic population extends throughout the state of Texas, those counties having the highest concentrations, i.e., from 81% to 97% of Hispanics all fall within the southwestern quadrant of the state and comprise the "Border Corridor." According to the Texas Education Agency (1996), while minorities (of which Hispanics comprise the largest group) comprised 53.6% of the student population in Texas, only 10.2% of the educational diagnosticians were Hispanic. Of the latter, an unknown but an estimated significant number are essentially monolingual in English.

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Along the lower "Border Corridor" (beginning approximately halfway along the Texas-Mexico border and extending to the Gulf of Mexico), a needs assessment completed by LEA Special Education Directors located beyond a half-hour's driving time from a university revealed that at least two educational diagnostician positions have gone unfilled for over a year due to lack of certifiable staff and there exists an anticipated need for an additional 41 diagnosticians, preferably bilingual, within the next five years (Hausman, 1997). Of the four universities within the lower Border Corridor, one has closed its special education program and another no longer admits new students into the educational diagnostician training program. The remaining two universities are both located within the lower Rio Grande Valley area at the tip of Texas, leaving several hundred miles along the border unserved.

Where possible, shortages in specialty personnel such as educational diagnosticians have resulted in issuance of conditional or emergency permits. However, due to the lack of university-based training programs within driving distance, most individuals find it difficult, at best, to obtain the necessary education to continue maintenance of these emergency permits. As a result, the Texas Higher Education Coordinating Board as well as the Office of the Texas Commissioner of Education have been encouraging the development of alternate strategies, including the use of distance learning. Hence the development of the proposal entitled "Distal-based preparation of educational diagnosticians serving in bilingual contexts," that resulted in an OSEP-funded personnel preparation project. The project, centered at the University of Texas at Brownsville & Texas Southmost College (UTB-TSC) and renamed Project DEED, Distance Education for Educational Diagnosticians, involves internet-based videoconferencing in combination with computer-based, multimedia learning modules, supplemented by CD-ROM based independent study units, field supervised and individually mentored practica as well as two campus-based summer training institutes.

Distance learning or education, alone, can no longer be considered truly "unique" as some form, e.g., home study, correspondence study, independent study or external studies, of delivering university-level courses have been in effect for almost 300 years (Spooner, Spooner, Algozzine & Jordan, 1998). Indeed, a quick ERIC search revealed 1,475 entries since 1992. Fully 25 of these entries involved distance learning over the internet. While many articles cited are theoretical in nature, many others report networks used to support comprehensive training programs in Hawaii (Meyer, 1995), Kentucky (Collins, Hemmeter, Schuster, & Stevens, 1996), North Carolina (Belk, et. al., 1995), Alaska (Starlings, Wheeler, & Porterfield, 1994), and Iceland (Myrdal, 1994). Current practices reported in the literature involve synchronous communication (e.g., two-way audio, two-way video in real time via streaming, or two-way audio, one-way video in real time) or asynchronous communication (E-mail list servers, chat rooms, etc.), using networked telecommunication systems as well as the internet to effect distance learning. Recent articles (Foegen, Howe, Deno, & Robinson, 1998; Spooner, Spooner, Algozzine, & Jordan, 1998) have offered reviews of the range of and relative efficacy of differing distance education approaches.

Although electronic distance education is not particularly new, it remains essentially an untapped resource. Most of us in small, rural and/or minority IHEs have had to find relatively inexpensive ways to enlarge our particular catchment areas to keep programs viable as well as provide needed services in the rural portions of our areas. In most cases, we have also had to "reinvent the wheel" on our own due, in part, to the competitive nature of IHE funding. Based on available literature, it would seem that the internet could prove useful as an inexpensive way to address distance education. The intent of this paper is to share the developmental steps (failures & successes) involved in the development and initial evaluation of a local, federally funded project focusing on presenting courses in special educational diagnostics to rural communities along the Texas/Mexico "Border Corridor" too distant from IHEs for teachers/aides to attend.

Development of an Idea

The closing of one of the four university-based special education programs within the South Texas Border Corridor exacerbated an already serious situation involving special education personnel shortages. Yet, at approximately the same time special telephone trunk lines, i.e., T-1 fiber optic linkages, were extended to all rural school systems in the geographic area. This, coupled with the recent development of economical audio/visual conferencing systems, e.g., CU-SeeMe (White Pine Software) and Microsoft NetMeeting, inexpensive videocameras, e.g., QuickCam VC (Logitech), as well as user-friendly multimedia production utilities programs, e.g., QUEST Net+ (Allen Communications, 1995), made it feasible to offer multimedia-based presentations accompanied by videoconferencing (with a choice of video and audio codecs for best performance over a variety of network speeds).

Previous experience along the Texas-Mexico border heightened an awareness that the dominant, traditional Hispanic culture found within the Border Corridor supports differing learning styles. An expanding body of recent research has identified preferred learning styles characteristic of Hispanic students (e.g., Dunn, Griggs, & Price, 1993; Griggs & Dunn, 1995; Jalali, 1988). Based on this research, teachers should expect larger numbers of Hispanic students to prefer a cool environment, conformity, peer-oriented learning, kinesthetic instructional approach, a high degree of structure or formal design, variety as opposed to routines, and a field-dependent (or group oriented, cooperative) cognitive style than their mainstream Anglo peers. While the majority of the learning styles research has focused on elementary or secondary students, postsecondary level research has begun. A current, ongoing research project exploring the preferred learning styles of college and university level Hispanic students has tentatively identified patterns of learning preferences similar to those found on the elementary and secondary levels (Hausman, 1998).

The QUEST Net+ utilities program chosen for use within Project DEED permits the combination of video clips, various illustration types, graphics animation, audio overlays, and text, all with preprogrammed instructions and, with the use of preprogrammed C language, into interactive multimedia modular units. These modular units are also designed to present over the internet (with participant/ student responses recorded on the sender server). The use of CD ROMs permit sharing high-security modules, e.g., specific diagnostic tests, via regular mail. The addition of videoconferencing in parallel with the multimedia modules will permit real-time voice communication with acceptable, though slower, video. The multimedia nature of the QUEST-based programs should fit the traditional Hispanic students' preference for structure as well as variety. When interactivity is built into the modules and combined with extensive workbooks to accompany each instructional unit, the reported preference for kinesthetic instructional approaches should also be addressed. The incorporation of videoconferencing, hopefully, should reduce the feelings of isolation and separateness from others in the project, feelings often reported in the literature. Provision of the professor's interactive "telepresence" should appeal to the traditional conceptualization of formal instruction and respect for authority often reported of traditional Hispanic students. Being able to call students by name, equally directing questions to the entire cohort and providing positive feedback and encouragement, we hope to be able to reduce the typical effects of absence of physical presence, e.g., a tendency to be distracted from a "talking head" or passivity.

Cooperatively derived ground rules will be required prior to the initiation of the internet based courses to manage the give and take between students and professor. Certain types of questions, for example, may need to be deferred to a chat room situation for a fuller treatment. Monopolization of conversation by certain students, lack of responsiveness by others, and even off task behavior may also need to be addressed within the ground rules established.

Approximately 8 to 10 distal sites will be established. Each site will consist of a cohort of 2 to 3 individuals working collaboratively as teams, separate from yet an integral part of the whole cohort of 20

students. They will be brought together for two summer institutes on the UTB-TSC campus (1999 & 2000) as well as be connected, for group projects, through the videoconferencing linkages, e-mail based communication, list servers and chat rooms. Collaborative interaction within the learning process will be emphasized.

Implementation of the Project

Acquisition of sufficient space to accommodate the technology and develop the requisite instructional modules or units is a major, initial need. Some universities maintain space allocation within a general or university-wide pool while others divide available space among various departments or divisions of the institution. The latter situation would seem to produce the most difficulty and delay in project initiation, particularly if your own department does not have sufficient free space. Previously allocated space, understandably, would probably not be easily obtained. The development of a series of computer-based multimedia modules requires extensive work space as well as storage space for layout, editing, testing, graphics production, and the ever present reediting. For our project, a classroom, normally accommodating 20 to 25 students, has been designated on the UTB-TSC campus. Anticipated is a four-year commitment for the life of Project DEED.

Technological infrastructure is also a major consideration prior to the initiation of such a project. Federal funding for Project DEED was requested on a shoestring basis; the negotiation phase further reduced the overall funds. As a result, the three computers in use derived from differing sources: my office computer was moved to the new room, the School of Education located a surplus PC, and the Academic Computing program volunteered a third. As a result, each of the faculty and staff have access to individual computers. As important, the room required extensive 'wiring' and the purchase of sophisticated switching devices to accommodate the technology and enable the establishment of clear, fast linkages to/from on- and off-campus sites. In our particular case, the cost of this was readily borne by a strongly supportive administration.

A team approach, involving many, if not most of your campus technology staff working closely with the project staff and other support personnel is definitely required to develop such a program. Initial installation involves the establishment of the requisite connectivity of the various computers, installation of new, speciality equipment (e.g., expanded memory, RAM as well as hard drive capacity, scanners, video capture cards, etc.), installation of software, and advice on implementation of distal site setups. Anticipated throughout the project is continued involvement in an advisory capacity as troubleshooters when the need arises. Such support is vital and needs to be established prior to the initiation of any distance education program. For Project DEED, we were extremely fortunate in the leadership and staff commitment offered by the Academic Computing program.

Staffing also needs to be developed within a team approach model in that each participant will need to wear many hats. Each of the three of us working within Project DEED have differing assignments yet, of necessity, we overlap roles with all of us developing skill in the construction of multimedia instructional units and skill in use of specific software. In our case, federal funds cover one-quarter of my time as Principal Investigator, 100% of the project coordinator's time, and 75% of the photographer/graphics artist/computer specialist's time. An additional one-quarter release time was also provided by the School of Education Dean for the principal investigator. Such time commitments need to be considered in program development as the conversion of standard, traditional lectures into true multimedia format requires an extensive amount of time. Our first semester on Project DEED focused on location and employment of project staff, staff training on basic equipment and requisite software, identification of and ordering equipment to be used for the project, as well as initial recruitment of the distal sites and cohort members. The first multimedia instructional units were not begun until the first of the Spring semester.

Acquisition of equipment also requires extensive team effort for involved staff as well as program consultants. Technology is continuing to evolve; what was "state of the art" when our initial proposal was entered into the federal competition was out of date or antiquated a short year later. As a result, on-campus technology specialists as well as additional knowledgeable contacts (e.g., the second author) provided a wealth of recommendations. Unfortunately, there was the occasional difference of opinion that required project staff to see additional information as well as a third opinion. Even then, some surprises occur. For example, instead of basing video imaging on the super-8 video system, digital video cameras with acceptable resolution began to fall within our funding range. Instead of VHS videotapes, we then needed digital cassettes specific for the camera. In addition, a player was recommended to avoid wear and tear occasioned by using the camera as a playback device. Conversion to digital format also required purchase of a digital capture card. (The non-linear capture card was still needed to convert the occasional VHS format information to digital format.) All of the above was agreed upon by our consultants and purchased. Only after receipt and installation of the above did we find out that it wouldn't work without a SCSI drive. This, in spite of the facts that our consultants had not mentioned the need, nor had the specifications provided with the digital capture card. Our recommendation is to determine what equipment is essential to a specific approach to distance education and then locate the equipment, determining availability of same on campus. Since Project DEED is committed to converting all presentations for 8 courses into distance education over the internet in multimedia format, we have broadened our dedicated equipment base through federal funding to allow a wider range of product, e.g., video clips of specific children/activities convertible into still shots which, in turn, can be converted to line drawings or sketches, with graphics animation added to enhance specific detail for instructional purposes.

Any innovative or novel approach always seems to encounter a variety of challenges. Our project is certainly no different. At present, field trials have been initiated with several videoconferencing systems, e.g., CU-SeeMe, Microsoft Netmeeting, Real Player. When the original project proposal was developed, commercial consultants assured the first author that they were able to combine, on a single screen at each distal site, both videoconferencing and multimedia training presentations. The price noted was 'well within reason with special educational pricing.' As it turns out, at least one such program, i.e., ClassPoint (White Pine), has been developed. Unfortunately, the educational cost for a 10 user bundle is around $5,100; a nice figure relatively speaking but beyond the budget capabilities experienced by many small, rural universities. Since the intent of our particular project is the demonstration of the use of inexpensive, readily available equipment/software, we are now exploring how to obtain the original effect of presenting multimedia modules simultaneously with videoconferencing. Options discussed thus far include software adaption, toggling between instructional module and videoconferencing, and employing two separate computers at both on-campus and distal sites, one for videoconferencing and the other for the instructional module. In addition, to avoid difficulty and delays associated with data transmission without videostreaming, the stand-alone, QUEST-based instructional modules will either be downloaded to each distal site prior to the scheduled class period or from a previously mailed CD-ROM. To assure the security required for the various psychoeducational tests, all test training modules will be converted to CD-ROM format for delivery to the distal sites. According to the project proposal, the multimedia instructional modules will be designed for both synchronous and asynchronous presentation. Synchronous delivery will be during a scheduled three-hour session held once each week of a regular semester, with the instructional unit running in parallel with videoconferencing. By adding the speaker's content in audio format while developing each instructional unit and providing a button to access the audio version, each module could also be available via asynchronous presentation. Asynchronous delivery was deemed important in the event cohort members miss scheduled sessions due to job-related conflicts as well as for use in the ongoing review process required of the cohort members.

Selection of any distal-based cohort would be unique to each situation. In our case, federal funds are available for up to 20 bilingual, certified teachers to cover cost of tuition and fees, texts and other

materials as well as travel and state mandated per diem (food and lodging) for on-campus institute attendance. Identification of interested sites that can also provide the requisite on-site technology to participate as well as identify the cohort membership has, thus far, taken the most time and energy. At present, we are approaching the final selections. Once each course is converted to multimedia format and put into place with the project cohort, however, offering specific courses to other individuals employed at any LEA serving as a project site would be a relatively simple matter of locating sufficient numbers of interested individuals to 'make' a class and processing their own personal matriculation. The majority of courses involved in our educational diagnostician project are also applicable in the preparation of generic special education teachers, hence, an anticipated by-product of the grant will be the expansion of our overall special education program.

Conclusion

In spite of the various difficulties thus far encountered, the project has been able to meet its predicted deadlines. Field trials of actual delivery of the instructional modules in combination with distal videoconferencing will be initiated between on-campus sites, then presented as two sessions at an upcoming state convention for special educators meeting in a city some five hours drive from the UTB-TSC campus. By midsummer, conversion of the Fall introduction to special education course lectures should be completed. Each semester thereafter, module development will focus on each course scheduled for the following semester. As the project progresses and the various difficulties are resolved, dissemination of the 'resolutions' and additional recommendations will structured through conference presentations as well as our to-be completed WEB site.

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