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Technology-Mediated Instruction in Distance Education and Teacher Preparation in Special Education

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In this article, the authors examine the literature on distance education and offer a brief chronology of its past-to-present development, with special attention to the evolution of technology-mediated instruction. They document some of the major trends related to both theoretical and practical aspects of distance education. In particular, they look at the significance of the design of instruction and the importance of preserving faculty–student communication. Next, they look at the challenges as well as opportunities that distance education affords students, faculty, and institutions of higher education. Finally, the authors summarize what they believe to be major issues to be resolved if educators are to improve the quality of distance education and speculate about what the future might hold with regard to distance education and special education.

Keywords: *technology-mediated instruction; distance education; asynchronous learning environments; instructional design*

Although recent technological innovations have revolutionized the way institutions of higher education (IHEs) prepare students, the concept of distance education is not new. In fact, its history spans over two centuries, dating back to the early 1700s in Europe (M. G. Moore & Kearsley, 1996; Rowntree, 1986; Verduin & Clark, 1991). In the United States, correspondence programs originated at the University of Chicago, just prior to the turn of the 20th century (Prewitt, 1998). Considered the first generation of distance education, correspondence courses were conducted through the mail, with the goal being to provide access to higher education for those students who could not otherwise attend. In that correspondence education required a reliable, two-way delivery of curricula and students' work, the establishment of the U.S. Postal Service made possible the widespread use of correspondence study.

In the early 1920s, we witnessed another milestone in the evolution of distance education. It was at that time that the University of Wisconsin introduced broadcast instructional radio. This innovative use of technology made it possible for literally thousands of students to simultaneously learn from some of the best and brightest instructors in higher education (Prewitt, 1998; Watkins & Wright, 1991). Since then, distance education has continued to grow, and today it occupies

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center stage at a burgeoning number of college and university campuses across the country.

In what follows, we begin discussion by briefly examining the evolution of distance learning. Next, we look at both theoretical assumptions and practical aspects of distance education and personnel preparation in special education. We highlight the importance of the design of instruction and its influence on the quality of special education teacher education. Finally, we consider the challenges as well as opportunities associated with distance learning and what the future may hold for teacher education in special education.

A Historical to Contemporary Perspective on Distance Education

First, there were correspondence courses; then there was the broadcast of instruction via the radio. However, the emergence of educational television represented a major development in the evolution of mediated instruction. Originating at the University of Iowa in the 1930s, instructional television ushered in a new era in higher education, largely because of an expectation of high-quality instruction (Chamberlain, 1980; Verduin & Clark, 1991). Notwithstanding the initial enthusiasm, university personnel quickly discovered several significant limitations. Like radio-based instruction, televised lessons originated from a single location that precluded any meaningful teacher–student interactions. It was impossible for students to seek guidance regarding any aspect of instruction. Furthermore, some of the televised images served to distract students rather than facilitate their learning. Finally, Tiffin and Rajasingham (1995) noted that, contrary to its original promise, there was scant evidence of a greater impact (i.e., increased subject matter knowledge or comprehension) on students receiving televised versus face-to-face instruction.

Advances in instructional technology, coupled with a desire to expand access to university instruction, have dramatically transformed the present-day concept of teaching and learning in higher education (e.g., Ludlow, 2005; Peters, 1998; S. Smith & Allsopp, 2005). Consonant to the growth of technology is the growing role of university faculty in determining how best to design, organize, and deliver instruction. Finally, students are finding it easier then ever to access university coursework via distance learning (Beard & Harper, 2002; Bennett & Green, 2001; St. Pierre, 1998).

Distance education takes one of two basic forms; it can be synchronous (i.e., live) or asynchronous (i.e., archived). Video conferencing represents one common form of synchronous instruction in which the instructor and students are separated by space but not by time. Synchronous instruction most closely mirrors traditional instruction, by allowing for ongoing interaction among participants. However, there are substantial costs associated with both the equipment required and facilities necessary to accommodate this type of instruction (Cookson, 2000; Hoffman, 2002). Furthermore, the use of relatively high-tech instruction (i.e., video streaming) can pose problems for students, some of whom may lack proper equipment to access and/or prerequisite skills to manipulate the media. Finally, although the use of synchronous instruction makes it possible to reach students unable to commute to a central location, there still are constraints associated with traditional class schedules.

In contrast to synchronous instruction, asynchronous instruction, such as prerecorded programming viewed at the student's convenience, allows both students and instructor to be separated by time and space. This form of instruction often is accomplished by means of the Web or CD-ROM. Asynchronous instruction tends to be most popular, because it affords students maximum

flexibility in taking coursework (Hoffman, 2002). In many instances, distance learning reflects a combination of synchronous and asynchronous instruction, both of which are integral to the preparation of special education personnel (Mohr, 2004).

Distance Education and Special Education

The field of special education has long struggled to overcome significant and persistent shortages in classroom personnel. Various attempts to increase the number of professionals being prepared for the classroom have yet to resolve the problem. As the Office of Special Education Programs noted in its *Twenty-Fourth Annual Report to Congress* (U.S. Department of Education, 2002), we continue to experience a critical shortage of personnel to meet the needs of children with various disabilities. Nationally, 98% of school divisions report teacher shortages (Burgert & Burnette, 2001). The tension stemming from an insufficient supply of qualified special education teachers is compounded by an increase in the number of students being identified with disabilities. Faced with the daunting task of putting a highly qualified special educator in every classroom, a growing number of IHEs are looking to distance education as a way to address that challenge.

Results of a survey conducted by the U.S. Department of Education not only document the dramatic growth of distance learning but also its future expansion (Mariani, 2001). The survey captured some of the most notable developments, by noting that (a) approximately 30% of all postsecondary institutions offered courses that used distance learning technology; (b) approximately 50,000 postsecondary courses were offered using distance education technology; (c) of the 70% of postsecondary institutions that did not

offer courses via distance education, 20% reported plans to do so in 3 years; (d) 8% of all postsecondary schools offer degree programs and/or certificate programs that can be completed entirely via distance learning; and (e) the most popular forms of instruction included Web-based instruction, two-way interactive video, and prerecorded video.

Equally significant is the fact that 20% of IHEs surveyed by the U.S. Department of Education (1999) that did not currently offer distance education courses plan to do so in the near future. The reasons for the proliferation of distance learning programs are not entirely clear, but one could speculate that it is due, at least in part, to the positive outcomes for these institutions that offer such courses. Some experts assert that the surge in interest stems largely from a commitment to reach personnel in rural areas, where shortages are particularly acute and teacher retention poses a major problem—especially in special education (Edgar & Pair, 2005; Knapczyk, Chapman, Rodes, & Chung, 2001; Rosenkoetter, Irwin, & Saceda, 2004; Steinweg, Davis, & Thomson, 2005). However, as more IHEs implement distance learning, economic factors may garner an increasingly greater amount of institutional attention (Peters, 1998; S. Smith & Allsopp, 2005).

Theory and Practice in Distance Education and Special Education

A review of the literature reveals numerous references to the potential of distance learning as a means to address teacher shortages in special education (e.g., Harasim, Hiltz, Teles, & Truoff, 1995; S. Smith & Allsopp, 2005; Spooner, Spooner, Algozzine, & Jordan, 1998; Steinweg et al., 2005). However, Miller and Miller (2000) argue that an unfortunate by-product of the growing

interest in distance education is the dispro-portionate amount of attention given to tech-nology rather than instruction. Critics assert that, if technology-mediated courses are to be effective, rather than simply readily available, teacher educators must place more impor-tance on the design of quality instruction (e.g., Gunawardena & McIsaac, 2004; Miller & Miller, 2000). There is general agreement that colleges and universities make the most efficacious use of mediated instruction. Furthermore, absent a sound theoretical underpinning to guide that instruction, there is the risk that distance learning will be little more than an electronic correspondence pro-gram, based largely on text-based assignments and individual activities (Mohr, 2004).

In an attempt to provide direction and stability to the rapidly growing field of dis-tance education and special education, vari-ous authorities have sought to build a theoretical framework. For example, based on some generally agreed-upon characteris-tics that define distance education, Keegan (1986) grouped principles of distance edu-cation into three broad categories: (a) inde-pendence and autonomy, (b) industrialization of teaching, and (c) interaction and commu-nication. Although none of these theories is universally accepted, one or more exist in nearly every program of special education distance education.

Independence and Autonomy

The concepts of independence and auton-omy are based on the notion that education is student driven. In many cases, students are able to choose their own course of study, work according to their schedule, and deter-mine the pace at which they progress. A prime example of autonomy can be found in Moore and Kearsley's model (1996) of distance edu-cation in which emphasis is on learner inde-pendence and reflects a systems approach that is akin to independent learning (K. B. Moore,

2000; M. G. Moore & Kearsley, 1996). We should note that these authors placed tremen-dous value on interpersonal dialogue between the instructor and the student. Later, K.B. Moore (2000) reconfirmed the importance of interpersonal dialogue between the instructor and student.

Industrialization

The idea of industrialization of education can be thought of in terms of the commer-cialization and distribution of learning within a free-market, demographic society. Given the shortage of qualified special education teach-ers, a number of IHEs have developed alter-native licensure options. In many cases, the goal is to increase the so-called market share (i.e., number of students served), by using technology to make education available to as many as will access it. Educating larger num-bers of students creates the need for more per-sonnel to assume highly specialized roles related to course design, delivery, and student assessment. However, if that instruction becomes too fragmented and students feel socially isolated, the quality of education is compromised. In espousing a position at odds with Moore and Kearsley's philosophy (1996), Peters (1998) asserted that students will ultimately suffer as a result of an educa-tional delivery system that encourages indi-viduals to study and explore knowledge in isolation. The industrialization of teacher preparation is a major factor in current alter-native licensure programs in special education (Gable, 2004; Rosenberg & Sindelar, 2001).

Interaction and Communication

Communication between students and the instructor has long been viewed as essential to quality teacher education. According to Holmberg (1986), this is especially true of distance education. Holmberg sought to make the connection between two-way

communication and the effectiveness of distance learning. He underscored the critical role of ongoing dialogue between instructor and students, as well as among students. Holmberg also contended that factors such as emotional involvement, satisfaction, and motivation are all part of achieving successful student outcomes. More recently, Cain, Marrara, Pitre, and Armour (2003) further documented the pivotal role that peer support plays in defining the nature of the teaching and learning experience.

Mirroring sentiments expressed when televised instruction burst onto the scene, a number of authorities have called for an emergent "theory of equivalency." The notion of equivalency relates to the fact that distance education and traditional university instruction should reflect the same level of academic rigor and produce similar student outcomes. However, like Steinweg et al. (2005) and Tiffin and Rajasingham (1995), we found little evidence that researchers have sought to compare and contrast the efficacy of distance versus traditional face-to-face instruction. Most of what we found was related to consumer satisfaction data rather than more rigorous evaluation efforts.

The Design of Distance Education Instruction

The speed with which changes in distance education are sweeping postsecondary institutions is unsettling to some and has triggered widespread debate regarding the quality of instruction (Burbules, 2000; Press, Washburn, & Broden, 2001). Supporters of distance education contend that technology-mediated instruction meets the needs of a burgeoning number of students and has both educational and financial benefits. They assert that postsecondary institutions should embrace technology-mediated instruction and should seek ways to improve on the outcomes of the teaching and learning process (Hoffman, 2002; Phipps & Merisotis, 1999).

As with traditional teacher preparation, the effectiveness of distance education hinges largely on the quality of instruction (e.g., Bates & Poole, 2003; Collins & Grisham-Brown, 2001; Simonson, Smaldino, Albright, & Zvack, 2000; Tindal & Crawford, 2005). The design and development of a distance education coursework depends on (a) the nature of the content, (b) learner characteristics, (c) instructional environment, (d) instructional team, (e) instructional format and strategies or activities, (f) technical and administrative support, and (g) evaluation of outcomes (Hoffman, 2002). Although several models have been developed to guide instruction (e.g., Anderson & Anderson, 2005; P. L. Smith & Ragan, 1993), there are few theory-based approaches to the design of technology-mediated distance education (Blackhurst, 2005).

In attempting to fill that theoretical void, P. L. Smith and Ragan (1993) proposed a design process that involves eight steps and together represent a synthesis of key components of existing models: (a) learner analysis, (b) content analysis, (c) analysis of the learning task, (d) assessment of learner performance, (e) development of instructional strategies, (f) production of instruction using technology, (g) a thorough evaluation, and (h) revision instruction as appropriate. In our survey, we found that many IHEs are incorporating universal design and principles of effective instruction into distance learning, such as strategic integration and judicious review (Kame'enui, Carnine, Dixon, Simmons, & Coyne, 2002). When designing distance instruction, it is important that consideration be given to compliance challenges outlined in Section 508 (n.d.) of the Rehabilitation Act to ensure access by individuals with disabilities.

Another recent development is the gradual decline in enrollment in video conferencing

courses while student participation in Web-based courses is steadily increasing (King, Nelson, & Restauri, 2002). If this trend continues, it will have serious implications regarding the design of instruction, owing to some of the unique characteristics that distinguish Web-based instruction from other forms of distance education (e.g., Bennett & Green, 2001; Carr & Carr, 2000; Kemp, Morrison, & Ross, 1994).

University faculty and distance learning. University faculty has long played a pivotal role in the preparation of special education personnel. There is ample evidence that colleges and universities that offer distance education must ensure that faculty receive adequate preparation, along with the necessary resources to deliver quality instruction. When university faculty members are able to make appropriate use of technology, the high-tech medium of distance learning promotes student learning; absent those skills, university faculty can actually hinder student success (King et al., 2002).

Various authorities report that university faculty is initially reluctant to adopt technology-based instruction; however, faculty members are usually more accepting if they are provided with adequate training, time, and resources (Cooper, 2001; Coppola & Thomas, 2000). At present, the amount of initial training and ongoing technical support afforded to faculty engaged in distance learning varies considerably from one university to another (Perreault, Waldman, & Alexander, 2002). At some universities, faculty members are given extensive assistance and support, whereas, in other settings, they are expected to develop distance education courses with little or no assistance (Mohr, 2004).

University students and distance learning. The infusion of technology into higher education has led to a fundamentally different approach to teacher preparation. As our previous discussion suggests, technology-based instruction is inherently more learner centered than teacher centered (Petrides, 2000). That is, the format of technology-based distance learning programs requires that students develop their own knowledge base, while working cooperatively and regularly sharing ideas, opinions, and work projects with classmates (Coppola & Thomas, 2000; Kemp et al., 1994; McFadzean & McKenzie, 2001). Other researchers concur, and they maintain that with distance education, the bulk of the responsibility for learning rests ultimately with the student (M. G. Moore & Kearsley, 1996; Verduin & Clark, 1991).

Student attitudes vary significantly when it comes to distance education. Many students prefer distance learning to traditional campus-based instruction, especially when there is a high level of interaction built into instruction (Bauder & Simmons, 2005; Christensen, Anakwe, & Kessler, 2001; Fitzgerald, Mitchem, Hollingsead, Miller, & Koury, 2005). Other students feel that the use of technology should supplement but not altogether replace the classroom experience (Beard & Harper, 2002; Cooper, 2001). Still, other students feel strongly that, much like traditional face-to-face instruction, the instructor should assume the primary role in promoting teaching and learning. In a recent study, Cain and his colleagues (2003) found that some but not all students feel the need to receive institutional support; however, students perceive the overall learning experience far more positively if they receive individual faculty support (e.g., timely faculty response to student queries, information on additional textual resources, Web sites).

We found it interesting that, although many students claim to prefer courses offered online, the rate of retention is usually lower, compared to traditional classroom instruction (Mariani, 2001). Absent face-to-face contact

with faculty or classmates, some students lack enough self-discipline to keep up with course assignments; others miss the socialization associated with conventional instruction (e.g., Press et al., 2001). Many students who are accustomed to meeting in a traditional class-room setting and interacting with the instructor and classmates experience a sense of detachment and isolation. In addition, anecdotal evidence suggests that some students overestimate their ability to succeed in online courses while minimizing their discomfort in working in a virtual classroom environment (White, 2000). Others dislike the impersonal nature of distance education (e.g., Press et al., 2001). In that these and related factors likely influence the outcome of instruction, Wolfe and Snyder (1997) suggested that universities engaged in distance learning establish a follow-up procedure to determine the short-term and long-term impact on student learning, targeting both quantitative and qualitative dimensions of instruction.

Universities and distance learning. A major concern among university administrators is whether their program of studies complies with professional standards established by various accreditation bodies (i.e., National Council for Accreditation of Teacher Education, Council for Exceptional Children). Evidence is mounting that the use of technology-driven distance learning is consistent with standards-based instruction (Anderson & Anderson, 2005), can enhance collaboration among educational personnel in designing quality instruction (Campbell & Algozzine, 2005), and can become a medium for the effective integration of research into practice (S. Smith & Allsopp, 2005); this is an encouraging finding. Even so, there is little evidence that universities actually have come to grips with the problems associated with accessibility that relate to technology and persons with disabilities spelled out by the Information

Technology Technical Assistance and Training Center (n.d.).

Distance Education and Preparation of Special Education Personnel

There is little doubt that there are numerous advantages associated with distance education in general and special education teacher preparation specifically—advantages for students, instructors, as well as IHEs (Algozzine, 2001; Ludlow & Spooner, 2001). Perhaps the greatest advantage for students is the freedom from having to attend on-campus classes at a predetermined time. According to Hoffman (2002), technology-based instruction offers students the opportunity to access courses from the comfort of their homes and workplaces. It also affords students the opportunity to complete coursework at times of the student's choosing. In addition, Web-based courses provide students a means to communicate with and receive feedback from both fellow students and the instructor by means of discussion postings, chat rooms, team assignments, and e-mail. Many university faculty members permit students to electronically submit assignments (e.g., Blackboard-based Digital Dropboxes). Last, but equally important, is the minimization of constraints that traditionally have posed problems for students—namely, geographic distance, scheduling conflicts, expense, and constraints that become less prohibitive with emergent technology (Blackhurst, 2005).

Both research and experience document the fact that effective instruction goes beyond the mere transmittal of information to students; it includes opportunity to observe, model, and apply discrete strategies and to collaborate with classmates in simple to complex case learning activities (e.g., McFadzean & McKenzie, 2001). The most successful students draw on these peer interactions and are able to perform well in an

instructional environment that encourages reciprocity and cooperation among students. Furthermore, there is growing empirical evidence that, to be successful, students must have frequent opportunities to engage in highly interactive, problem-solving teaching and learning activities (Cooper, 2001; Mercer, 2004). These findings have a number of implications regarding both the design and delivery of instruction.

There are some significant advantages to distance education for instructors as well. Foremost among them is the added flexibility and increased opportunity to encourage students to actively engage in the learning experience (e.g., live two-way verbal interaction, e-mail, chat rooms, discussion boards, video streaming; Bennett & Green, 2001). In addition, distance learning offers university faculty a way to quickly post new course material for students to access (Mariani, 2001). And distance education methodologies are highly adaptable. With sufficient technological assistance and support, faulty members can easily embed video and/or various printed material into their instruction (e.g., movie or classroom video clips). Even so, the lack of closed captioning of textual material constitutes a major limitation of current distance education teacher education.

Quality Special Education Preparation and Distance Education

Notwithstanding the usefulness of technology-based distance education in special education, there are unanswered questions that relate to the shift from face-to-face instruction to virtual classroom instruction (Palloff & Pratt, 2003; Perreault et al., 2002). As distance education continues to grow and mature, university faculty and students will likely be increasingly dependent on high-tech

instructional methodologies. Universities are beginning to be more proactive with regard to identifying potential obstacles to quality instruction and developing solutions that will optimize student learning (Burbules, 2000; Perreault et al., 2002).

As we previously suggested, most students prefer more interactive learning environments to less interactive learning environments (Christensen et al., 2001; Fitzgerald et al., 2005). Unfortunately, not all distance learning programs offer students an opportunity to engage in face-to-face instruction (Mohr, 2004). One consequence is that students who lack self-discipline and time-management skills become lax and fall further behind in their studies (Zirkle, 2000). To counter this problem, faculty may need to allocate time at the beginning of a course to provide students explicit instruction in these areas (e.g., advanced organizers) and to provide students with various self-assessment strategies such as "KWL" (i.e., what I do Know, what I Want to know, and what I have Learned). University faculty must find ways to make technology-based distance learning highly interactive (e.g., cooperative learning, lecture pause strategy), as engaging as possible (e.g., think-pair-share, team-based activities), and reflective of high student expectations (Coppola & Thomas, 2000; Loeding & Wynn, 1999; Rosenkoetter et al., 2004). A related issue is that of content presentation and the use of segmented instruction. Segmented instruction refers to the clear delineation of one lesson unit from another and the imposition of a time limit on the amount of time devoted to each lesson (e.g., 10 to 12 minutes), with each segment lined by judicious review.

As Beard and Harper (2002) pointed out, students who are able to assume an active role in the teaching and learning experience routinely demonstrate superior academic performance. This finding may be particularly

important to those involved in the preparation of special education personnel. Faculty who participate in technology-mediated instruction must accept the challenge of accommodating a heterogeneous group of students by examining closely traditional forms of instruction and discovering ways to better serve their distance education students (Childress & Overbaugh, 2001). Faculty can do so by (a) addressing the needs of students with limited, if any, face-to-face interaction (e.g., cooperative learning options, learning communities); (b) adjusting course content to accommodate a diverse audience; (c) focusing on the teaching and learning process within a technological delivery format; and (d) becoming a skilled facilitator of the teaching and learning process rather than merely a content source of information (e.g., Childress & Overbaugh, 2001; King et al., 2002).

According to the literature, some students lack the prerequisite skills to be comfortable in the technology-based learning environment (Bennett & Green, 2001; Cerny & Heines, 2001). This lack of comfort is sometimes exacerbated by unforeseen technical problems (e.g., establishing and maintaining Internet connections, finding and downloading necessary plug-ins; Perreault et al., 2000; Piotrowski & Vodanovich, 2000). Students' skill and comfort level regarding the use of technology can be increased if faculty incorporates specific components into the overall design of the course. For instance, students and faculty become better communicators when specific instructions are given regarding how to foster faculty-to-faculty, faculty-to-student, and student-to-student communication and interactions (Helpern, 1994). As we have discussed, students who receive direct instruction in ways that integrate both knowledge and skills (e.g., concept mapping, graphic organizers, mnemonics, study guides) are more likely to accept this approach to

instruction (Brookfield, 1995). In preparing students to work with children or youth with disabilities, it is particularly important that instructors model strategies of proven effectiveness with special student populations (i.e., advanced organizers, mediated scaffolding, judicious review, and scoring rubrics).

Some experts express concern over the inordinate amount of time that is required to design a distance learning course and the lack of faculty training in the use of instructional technology (Bower, 2001; Vodanovich & Piotrowski, 2001). Too often, there is only a modest level of assistance and support available to the distance learning faculty (Scigliano & Levin, 1999; Serwatka, 1999). To remedy this problem, some special education departments have secured the services of instructional design experts within or outside the university (Robbins, 1997). These individuals become an important member of a team charged with developing distance education courses. Ordinarily, the role of the expert includes (a) offering faculty instruction in pedagogical methodology, (b) providing hands-on training with instructional technology, (c) assisting with course design and class preparation, and (d) providing group support. Experience suggests that expert assistance is especially useful to university faculty facing major time constraints (e.g., Mohr, 2004; Robbins, 1997). Although faculty attitudes regarding technology-based instruction are relatively positive (Vodanovich & Piotrowski, 2001), greater university commitment to faculty support seems essential to increasing the quality of distance education in special education.

If distance learning instruction is asynchronous, such as course content provided through CD-ROM, there are additional potential pitfalls associated with the teaching and learning process. For example, because neither students nor instructors can communicate with the same freedom and spontaneity

as in traditional face-to-face instruction, faculty must give special consideration to learners' needs and to the design of instruction. At this stage, many IHEs have a limited capacity to mediate technology-related challenges, such as closed captioning of instruction. This means that faculty may need to exercise greater flexibility with regard to their teaching practices (Brookfield, 1995; Osterman & Kottkamp, 1993). Others advocate providing students digital access to textual material, captioning graphics, and recording audio clips to textual content. Finally, strategies must be in place to compensate for the limited ability of instructors in asynchronous learning environments to clarify issues for students, elaborate on the content of instruction, or to simply answer their questions (Kemp et al., 1994). As Simonson et al. (2000) asserted, faculty must find the optimal level of the use of technology to meet the diverse needs of their students. However, the rapidity of new developments trigger changes in instructional technology (Burbules, 2000; Saba, 1998; Simonson et al., 2000), necessitating that IHEs be nimble enough to "embrace this virtual world or become less relevant in the value it adds to society" (Van Dusen, 1997, p. 2).

Impact of Distance Learning on Special Education Personnel Preparation

A nationwide shortage of special education teachers has prompted some dramatic changes in how we prepare special education teachers. IHEs, private corporations, and school divisions have devised various approaches to bolstering the teacher workforce (e.g., career switcher programs, dedicated field-based programs, military career transition programs). Generally speaking, these programs differ from traditional approaches in one or more

ways: (a) duration of instruction, (b) mode of delivery, and/or (c) participant pool (Rosenberg & Sindelar, 2001). Alternative certification programs that once served as an emergency "stopgap function" are now as much the rule as the exception, in part because of the potential for ameliorating local personnel shortages. Furthermore, the use of technology-mediated distance education enables teacher preparation programs to reach a disparate group of prospective educators, including those who otherwise would be unable to pursue a teaching certification. For that reason, distance education will likely play an even larger role in the preparation of future special classroom teachers (Cerny & Heines, 2001; Hughes & Forest, 1997; S. Smith & Allsopp, 2005).

Conclusion

By all accounts, distance education is becoming an increasingly popular way to deliver instruction to both preservice and inservice special education personnel (e.g., Mohr, 2004; Rowland, Rule, & Decker, 1996; Winton, McCollum, & Catlett, 1997). However, if distance education is to become a truly effective alternative to traditional classroom instruction, we must find ways to better meet the needs of our students in terms of effective course design, course content, and actual delivery of instruction. This will require refining and enlarging existing knowledge of special education teacher preparation as well as developing new ways to convey subject matter that is essential to addressing the diverse needs of students with disabilities (Mohr, 2004).

Today, colleges of education are searching for ways to meet the growing demand for highly qualified teachers, in adequate numbers and with sufficient skills, to address the academic as well as behavioral needs of

a diverse school age population. If the past-to-present evolution in distance education is any indication, those colleges and universities that strive to embrace the fast-growing and rapidly changing technology of mediated instruction and that dedicate themselves to making the best use of it will be well positioned to tackle the challenges of tomorrow.

Nevertheless, numbers alone do not tell the whole story. There are other challenges, including the high attrition rate among beginning special education teachers. The same technology that is used for initial teacher preparation may be a way to diminish the sense of isolation that many special classroom teacher experience (e.g., chat rooms, threaded discussion, Web sites). And with the passage of the No Child Left Behind Act of 2001, emphasis has shifted from voluntary to involuntary compliance, with the mandate to ensure that all students demonstrate satisfactory annual yearly progress, as reflected by their performance on high-stakes tests. Implicit in this legislation is the need to generate an empirical database to support the argument that distance learning is having a positive impact on the quality of classroom instruction of children and adolescents with disabilities. Last, as the field of special education teacher preparation moves rapidly forward, we should not overlook the significance of quality faculty and student interactions.

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