Using Audioteleconferencing to Link Occupational Therapy Graduate Students in the United States and Canada

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Lack of access to graduate education in the United States and Canada is a frustration for many occupational therapists who wish to further their careers. One way to overcome lack of access is to use technology to bridge the distances. The occupational therapy schools at the Medical University of South Carolina, Charleston, and Dalhousie University, Halifax, Nova Scotia, have collaborated for several years to provide graduate occupational therapy courses via audioteleconferencing. A general overview of the progress made in the project, as well as its design and unique features, is discussed. The major recommendation is that more occupational therapy schools could use distance education to collaborate when resources are few and needs are great. Such efforts benefit both faculty members and students.

Project Overview

MUSC, a small academic health sciences center with approximately 2,300 students, had designed its graduate occupational therapy program for working therapists to

When occupational therapists consider graduate education, they have usually been in practice for a few years. Typically, they reach a point in their careers when they recognize the need for more theoretical knowledge, better research skills, or more updated clinical practice. Entry into a graduate program is further influenced by family and financial responsibilities. If a suitable program can be found close by, particularly one that offers part-time options and evening classes, then occupational therapists are more likely to pursue a course of study. However, occupational therapists living in rural or remote areas may not be so fortunate. Enrollment in a traditional program that is located some distance away can place unacceptable demands on resources and relationships. Thus, limited local access to graduate programs, despite the number available in the United States and Canada, frustrates many occupational therapists in achieving their career goals (Mitcham, 1988, 1989a, 1989b, 1990a, 1990b; Mitcham & O'Shea, 1987, 1988).

One way to overcome this situation is for institutions to become more flexible and creative by using technology to attract and to interact with students at a distance. Communication technologies such as satellite, television, teleconferencing, and computer networks are all viable avenues for distance education, and state-of-the-art technology can link people around the world with increasing ease and sophistication (Bates, 1991). Teleconferencing shows great potential as a time-saving, cost-effective method of instruction (Gardner, Rudolph, & Delle-Piana, 1987). Two-way audioteleconferencing, the least expensive of the teleconference options, is particularly useful when interaction is desirable and visual material is not essential (Azarmi, 1987). Previous studies indicate that using teleconferencing can be as effective as using traditional methods of instruction (Haile & Richards, 1984; Nayler, 1985).

The purpose of this article is to describe a distance education project between the occupational therapy schools at the Medical University of South Carolina (MUSC), Charleston, South Carolina, United States, and at Dalhousie University (DAL), Halifax, Nova Scotia, Canada, for graduate students in occupational therapy. The project was developed in response to our mutual beliefs that cooperation between institutions, professional collaboration, and technology can advance the profession of occupational therapy in its graduate education endeavors. In this project we brought a selection of graduate courses to a geographical region where no formal occupational therapy graduate education was locally available.
take courses on a part-time, evening hours basis as part of the degree in Master in Health Sciences. DAL, a provincial university in Atlantic Canada offering a full range of undergraduate, graduate, and professional programs with approximately 11,000 students, did not have a graduate occupational therapy program, but the university was experienced in using communications technology to deliver courses in many subjects to students at a distance. Occupational therapists in Atlantic Canada had also expressed great interest in graduate study.

Consequently, the two occupational therapy school directors discussed ways in which they might use distance technology to offer some of the existing MUSC occupational therapy graduate courses to occupational therapists in Atlantic Canada. Following the results of an informal needs assessment in Atlantic Canada (O'Shea, 1986), we selected three courses for our project (Theoretical Models in Occupational Therapy; Analysis of Developmental Theories for Occupational Therapy; and Advanced Occupational Therapy Application to Childhood, Adolescent, Adult, and Aging Settings) that, by their theoretical nature, might best lend themselves to provision by distance education. Courses were designed around principles of self-directed learning.

We explored the suitability of the distance technologies and selected two-way, interactive audioteleconferencing (Love & Mitchell, 1987) as the major communication vehicle between instructor and students for the following reasons:

- DAL had previous experience with audioteleconferencing and a telephone bridge to link many sites.
- Cost was low compared with technologies such as videotape production or live television sessions via satellite.
- All participants could speak and interact with each other.
- The selected theory-based courses did not require extensive visual materials and support.

Course Design

The MUSC occupational therapy graduate program had been designed according to the seminal work of Knowles (1980) whose principles of adult learning and basic tenets indicate that adults (a) are self-directed and responsible for their own learning, (b) bring a wealth of experience to the learning environment, (c) are ready to learn when it will make a difference in some aspect of their lives, (d) generally have a problem-centered orientation to learning that requires immediate relevance to their lives, and (e) tend to respond more to internal sources of motivation, such as increased feelings of self-confidence or self-esteem, than to external motivators such as getting good grades.

When the three selected courses were redesigned for distance learning (Mitcham, 1989), these adult learning principles were supplemented with Wlodkowski's (1985) Time Continuum Model of Motivation, which draws upon the work of many motivational theorists and organizes itself around six major factors common to all. These factors are attitude, need, stimulation, affect, competence, and reinforcement. Wlodkowski (1985) suggested that the timely application of these six motivational factors at the critical times in the learning sequence maximizes motivation for adult learners. Applying these motivational factors to the course design helped the instructor (the first author) make sequencing decisions, such as developing learning activities to meet needs for structure at the beginning of the courses; combining audioteleconferences, on-site meetings, and independent learning activities for stimulation during the courses; and providing opportunities to demonstrate competence via presentations at the end of the courses (Mitcham, 1989).

The courses were redesigned to replace traditional classroom sessions with two-way, interactive audioteleconferences. To structure each audioteleconference for maximum student participation, learning guides were developed and mailed to students before the beginning of each course. These guides contained a series of learning activities dedicated to each course objective. Copies of required reading materials, with necessary copyright permission, were included in the learning guides because access to library resources is a major problem for students who live far from the educational institution. When appropriate, students bought a textbook for use in the courses.

Student preparation for each audioteleconference was guided by the learning activities, which typically included reading, answering questions, and applying information from the work setting to the course materials. Consequently, time spent during the audioteleconferences was dedicated to interactive discussion rather than to formal lecture. Learning activities were also designed for independent study after the audioteleconference sessions. Course requirements were not substantially altered for distance education, nor were they greatly different from the usual types of requirements in graduate courses, such as papers, presentations, and developing personal objectives.

Course Format

In 1987, the initial course offering through distance technology combined audioteleconferences with face-to-face on-site meetings at the beginning and midpoint of the course.

Audioteleconferences

Group discussion sessions using telephone transmission
provided the primary communication link among students and instructor. These audioteleconferences replaced the traditional evening class time. End-of-day hook-up took place when the telephone rates in both countries were less expensive. The sessions lasted approximately 90 min, which was quite a test of auditory endurance. Each audioteleconference was taped for evaluation and provided a useful back-up if any student could not attend a class.

Using distance technology, we could link students at different sites in a variety of ways. For example, in the first graduate course, delivered in the fall semester of 1987, we linked on-site MUSC students and instructor with 12 Canadian students at 6 different sites in Atlantic Canada. The audioteleconferences were initiated by the Instructional Media Services at DAL in the following manner: First, with the DAL telephone bridge, Canadian students at sites across Atlantic Canada were linked together. Second, with another telephone bridge at the Memorial University of Newfoundland, Canadian students at different sites in Newfoundland were added to the audioteleconference. Finally, the MUSC students and the instructor, who were together in a small classroom, were linked to the Canadian students. This configuration allowed all participants to talk to each other throughout the session.

For the next course offering, we added American students at sites distant from MUSC. Because there was no telephone bridge at MUSC, we approached the South Carolina Educational Television Network in Columbia. This network supports many educational endeavors and agreed to let us use its telephone bridge for our graduate classes. Using this bridge required the MUSC site and students at sites far from the MUSC site to dial a common telephone number so they could be linked with all other distance sites in Atlantic Canada. The most complicated configuration using three telephone bridges involved 27 students at 12 sites in the United States and Atlantic Canada. Figure 1 shows a sample configuration using three telephone bridges to link students at many different sites in both countries. When fewer sites were involved, we used only the South Carolina Educational Television Network bridge. Sometimes we only had one student at a site far from MUSC; in that case, the student telephoned the MUSC site directly and was connected to students in the classroom via the convener.

**On-site Meetings**

DAL was the on-site location for students in Atlantic Canada. The instructor and Canadian distance students travelled to Halifax for 1½-day meetings at each point. The beginning meeting included course orientation; introductory presentations by the instructor; orientation to the DAL Health Sciences Library, which provided interlibrary loan services to the Canadian distance students; and an introduction to audioteleconferencing organized by the DAL telephone bridge operator. The midpoint on-site meetings offered opportunity for in-class presentations by students and individual meetings with the instructor to discuss course assignments or other course issues. The value of these on-site meetings was confirmed by the high level of attendance by students from distance sites, in spite of personal costs of several hundred dollars.

With experience, we found that one on-site meeting was sufficient, preferably at the midpoint or end of a course. Midpoint on-site meetings allowed the instructor to guide and direct each student's work in a formative way and brought the Canadian distance students together, which offered much needed support for those participating alone in isolated sites. Bringing students together at the end of a course was a reinforcing strategy and allowed the instructor to evaluate oral presentations as well as written work. Audio or video presentations were accepted as a substitute for evaluating presentations of students unable to attend the on-site sessions.

**Enrollment**

American students were regular graduate students enrolled in the MUSC program. Canadian participants were permitted to enroll as special students in the MUSC graduate program. The MUSC Office of Enrollment Services set up records so that these special students could receive transferrable graduate credit for the distance courses and all transcript privileges. However, special students were advised that because transfer of course credits is the prerogative of each institution, they could not assume that credits earned would automatically be accepted by another graduate program. Because these distance course offerings provided the only opportunity for graduate study in occupational therapy in Atlantic Canada, the uncertainty of the applicability of credits earned to other graduate programs did not deter students from enrolling.

**Types of Learners**

Since the first distance course offering in 1987, 50 students have been involved in this project: 25 from Atlantic Canada and 25 from the southeastern United States. All participants were certified occupational therapists in their respective countries. Most therapists were employed in a variety of practice settings, such as acute care, rehabilitation, long-term care, home health, school system, and hand therapy, and a few had administrative or educational positions. Demographic data showed diversity of experience and a commitment to graduate education. Because the Canadian students had not had access to occupational therapy graduate education, they were, overall, older and had more work experience than the American students, who sought graduate education sooner after completing their undergraduate programs.

Assessment of learning styles using the Grasha-
Figure 1. Audio-teleconference network linking students at distance sites in the United States and Canada. NFLD = Newfoundland, NB = New Brunswick, PEI = Prince Edward Island, NS = Nova Scotia, NC = North Carolina, GA = Georgia, SC = South Carolina, MUSC = Medical University of South Carolina, SC-ETV = South Carolina Educational Television.
Riechmann Student Learning Styles Questionnaire (1975) showed that participatory and collaborative learning styles prevailed among the American and Canadian students. Overall, there has been little research on the learning styles of distance students. Wong (1992) found that distance learners generally perform better than on-site learners, a result attributed to a higher degree of motivation in the usually older distance students. In contrast, Harper and Kember (1986) found no significant differences in learning style between on-site and distance students.

Diversity of learner types was demonstrated on the Kiersey Temperament Sorter (Kiersey & Bates, 1984), a derivative of the Myers-Briggs Type Indicator. Participants were distributed among 13 of the 16 different personality types on this instrument. A major goal for participants, particularly for the American students, was to pursue postgraduate study. A few were interested in publishing, continuing education, and improving their clinical skills.

**Equipment**

The telephone bridge is the key piece of equipment for audioteleconferencing. Like a telephone conference call, the telephone bridge connects a number of telephone lines so users can talk to each other. Connections between telephone bridges allow large numbers of people to confer. Users may connect to the telephone bridge through regular telephones, speaker telephones, or convener microphones for group participation. To enhance quality at sites where groups were present, we used a Darome Diplomat Convener.1 The convener links the telephone line to the learning environment and amplifies the telephone transmission so the group can hear clearly. Microphones attached to the convener allow students and instructor equal access to the line. These microphones are off unless activated by a button, and therefore prevent background noise from being transmitted, which is a distinct advantage over a regular speaker telephone or a standard telephone receiver. More recent technology offers a hands-free, voice-activated microphone, which is even more comfortable for participants. Individual students in distant locations were linked to the bridge from their homes with regular telephone equipment.

**Costs**

MUSC course tuition covered the cost of the DAL telephone bridge, long-distance telephone costs, learning guides, and instructor travel. Canadian students paid their own application fees; course tuition in U.S. currency, often at unfavorable exchange rates; travel and per diem expenses when they attended on-site sessions at DAL; direct telephone or facsimile contact with the instructor, if they so chose; and, in many courses, postage for mailing their papers to the instructor at MUSC.

American students paid tuition and those at sites distant from MUSC paid long-distance telephone costs for the audioteleconferences, which averaged about $15 (U.S.) per class, and costs associated with any other direct contact with the instructor at MUSC. Sometimes these students incurred travel and per diem costs when they drove to MUSC to attend selected classes.

**Learner Outcomes**

All participants performed well in the distance courses they took. They always surpassed the minimum level of accomplishment (a grade of B or 3.0 or 85%) required for graduate courses at MUSC with a mean score of 3.77 on a 4-point scale. Academic scores did not, however, correlate significantly with demographic or learning style variables. Most participants evaluated the distance courses as effective. Those at MUSC thought the presence of the convener and microphones created an artificial distance between student and instructor, even though they were in the same room and had ready access to the instructor outside of class time.

Kirby (1989) conducted an external evaluation on the first course and found that, overall, the evaluation compared favorably with other distance courses, in a variety of fields, that he had evaluated in Atlantic Canada. American and Canadian students alike rated the course highly for its organization, which they found to be effective, demanding, and enjoyable. Kirby also analyzed the interaction patterns from the taped audioteleconference sessions and found a higher level of student-to-student interactions than in any other distance course previously evaluated (Kirby & Boak, 1987).

Of the 25 American students who participated in distance courses as part of their graduate experience, 17 graduated with the degree of Master in Health Sciences from the Medical University of South Carolina, 1 graduated with a graduate degree in health administration from another university, 3 are currently involved in formal postgraduate degree programs, and 4 have discontinued graduate work. A major factor influencing this level of completion is that the majority of American participants had reasonable access to the program at MUSC. Those 4 students who discontinued graduate study indicated two major reasons: other personal priorities or relocation from an educational institution. Most participants have remained in the clinical setting, with little change in job function. A few have moved into faculty positions or increased their clinical education responsibilities, and one or two have taken on more administrative or leadership roles.

To date, there is no graduate program in occupation-
Discussion

For students who do not have ready access to graduate programs, distance education provides an opportunity to experience graduate studies, affirm personal interest, and ensure capability for success before assuming the high costs and personal sacrifice required for completing a graduate degree. Occupational therapists in Atlantic Canada who have gone on to pursue graduate education have done so at great personal and financial cost, including relocation apart from their families for up to 2 years. The fact that 40% of the Canadian students who first experienced graduate education in this project went on to fully enroll in graduate programs demonstrates the importance of distance education courses for introducing students to graduate work.

For students located close to graduate programs, distance course offerings may not be a major factor in deciding whether to enroll or continue in graduate studies because the personal and professional risks are not so high. However, the availability of distance courses may make graduate education more convenient and efficient. Distance learning also offers an opportunity to broaden perspectives through interaction with new colleagues who would not otherwise be encountered.

Although distance education has been widely used and demonstrated effective in many fields (Haile & Richards, 1984; Nayler, 1985), our project demonstrates new applications not previously reported in the literature. In most distance courses, the instructor is distant from all students. The most important innovation in this project was the simultaneous use of currently offered graduate courses in one location and transmission to students in a different geographical location. This innovation was proved successful to the point that American students who had previously travelled to MUSC soon preferred to study via distance technology.

Another unique feature in this project was the international collaboration to share resources for the benefit of both institutions. Each institution had resources that were useful to the other: MUSC had graduate education and DAL had excellent technology resources for offering distance education programs. Atlantic Canada had a large pool of occupational therapists with no ready access to graduate programs in their field who wanted to try the graduate experience. These occupational therapists needed an opportunity to explore their potential for graduate work before applying to graduate programs distant from their homes.

The third unique feature in this project was the opportunity for students in both countries to broaden their horizons and interact with others far from home, in this case even across national boundaries. Without the distance component, most of the students would never have interacted with such a diverse group of peers.

Conclusion and Recommendations

Distance education offers many creative solutions for graduate programs to reach a larger proportion of occupational therapists. It provides an opportunity to extend the limited faculty resources in our profession by cross-listing courses between programs that are geographically separate. The geographical separation need not be great. Distance education offers as much to the student who lives on the other side of town from the educational institution as it does to the student who lives on the other side of the world.

As we advance into the 21st century, we need to seek ways to enable more occupational therapists to gain access to our increasing knowledge base. Distance technology must be fully exploited to realize this goal. This need is particularly relevant to education in a predominantly female profession such as occupational therapy, because it has been shown that more women are attracted to distance education programs and that distance education course completion rates are significantly higher for women than for men (Ross & Powell, 1990).

It is clear that we should continue our pioneering work in distance education and build on our experience to date. The nature of a graduate program, with its part-time and evening structure, lends itself well to the development of less traditional forms of course offerings. We need to be wise to explore the idea of distance courses with other graduate occupational therapy programs, a few of which have developed some distance learning options. We need to foster more collaboration between such occupational therapy schools and develop a mechanism so students will have a larger selection of courses from which to choose and we will have easier access to faculty member expertise from all corners of the world. Our dream is to develop an institute for international distance education in occupational therapy (Mitcham & Wilcock, 1991; Mitcham, Wilcock, & O'Shea, 1994).

Those who have studied distance education (Holmberg, 1981; Kaye, 1981; Pentz & Nell, 1981; Perraton, 1982; Wedemeyer, 1981) have all agreed that it is here to stay. In fact, it has been suggested that by the year 2010 more than 50% of all education in the United States will be "mediated education" (Pelton, 1991, p. 4). Institutions can no longer cling to the archaic insistence that students...
be physically present to learn. Our job is to explore further uses of distance education to remove barriers to education and promote a more equal distribution of knowledge in spite of limited resources.

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