ABSTRACT
A consortially developed continuing education series for rural nurses was implemented using videoconferencing technology. This article provides an overview of distance education technologies, the history and goals of the demonstration project at Edinboro University, and the coordination activities and instructional issues faced by the faculty. Participants became acquainted with distance education technology as they developed a process for program development, delivery, evaluation, and for awarding continuing education credits. The project was well received by instructors and students and testified to previous findings in the literature that distance education is a viable delivery system in terms of a teaching tool, learner satisfaction, and cost effectiveness.

Part of the mission of the Pennsylvania State System of Higher Education is to increase access to educational opportunities within the state. A unique opportunity was offered to its 14 member institutions to explore the practicality of distance education as a demonstration of the ability to deliver instruction to remote areas of the state and to initiate a sustained effort in rural education. In December 1994, the System published a request for proposals to provide grants for demonstration projects around the state to be delivered during the spring semester of 1995. Edinboro University, located in northwestern Pennsylvania, collaborated on a proposal with a sister institution, Clarion University, and the Warren/Forest Higher Education Council to provide a series of continuing education seminars to nurses in Warren, Pennsylvania. Edinboro and Clarion Universities are equidistant from Warren, approximately 60 miles on secondary roads. Warren County has no higher education institution within its borders and has a demonstrated need for continuing education for nurses working in the region.

Because Clarion University had already begun experimenting with videoconferencing, the two universities were able to quickly respond to this need without testing and evaluating equipment. The proposal was funded by the State System of Higher Education for the lease of PictureTel (Andover, MA) videoconferencing equipment for the Edinboro and Warren sites during the months of March, April, and May for the demonstration project. The grant also paid for the installation of videoconferencing lines in an instructional building and covered the cost of monthly line charges and per-minute charges when calls were established.

PROJECT GOALS
The overall goals of the project were broad. They were to:
- Deliver educational programming to a location that traditionally has had difficulty accessing higher education.
- Test the process of videoconferencing as a prac-
tical solution to distance education.
- Train faculty and build interest and enthusiasm for distance education.
- Experiment with adapting materials and methodology to accommodate videoconferencing.

PROFESSIONAL NURSING SERIES
The Professional Nursing Series was a logical application of the new technology because both Edinboro and Clarion Universities have departments of nursing and serve a large rural geographic area in northwest Pennsylvania. In this area, many nurses are employed at hospitals, clinics, home health agencies, long-term care facilities, doctors' offices, and public health departments. Access to continuing education offerings is difficult because of the need to travel long distances, usually over secondary roads. Yet emerging health-related information, new health care technology and delivery systems, as well as the need for continuing education credits to keep certifications in force, require nurses to participate in continuing education although it is not yet necessary in Pennsylvania for renewal of nursing licensure.

PROGRAM DEVELOPMENT AND COORDINATION
Coordinating the development and delivery of continuing education offerings via distance technology, while not difficult, was time consuming and often frustrating. There was a short time period of approximately 2 months between notice of funding and anticipated program delivery. Expert support from the universities' technicians removed a great deal of the concern that would normally accompany a first attempt involving new technology.

Program coordinators from the nursing departments at Edinboro and Clarion Universities and the Warren-Forest Higher Education Council played crucial roles and carried out specific tasks to make the Professional Nursing Series a reality (Table 1). Together, they organized course content, faculty, scheduling, and application processes to obtain Pennsylvania Nurses Association (PNA) approval to award continuing education credits to participants. Based on the program coordinators' knowledge of the expertise available within the respective faculties and the needs of nurses in the Warren-Forest area, an initial list of possible topics and presenters was identified, as well as a 10-week schedule of 2-hour offerings during the spring of 1995.

Armstrong and Sherwood (1994) detailed the extensive role of the site coordinator. The site coordinators managed a wide variety of practical and hospitality activities at sites of program origination and reception. At the site of origination, they provided faculty support and technical suggestions for effective presentation, and assisted in operation of the equipment. At the reception site, they greeted and registered participants, distributed complementary packets, provided refreshments, assisted with equipment operation, gathered evaluations, and forwarded them to the program coordinators. The remote site coordinator also managed registration and the classroom environment, and returned completed evaluation materials and attendance documentation to the university coordinators after the presentations.

TOPICS
Program coordinators from the universities expanded the list of possible topics with the assistance of the respective faculties and sent the lists to the site coordinator at the Warren-Forest Higher Education Council. The site coordinator met with local nursing contacts to select those topics which best served the needs of nurses at the remote site (Table 2). The university coordinators then alerted faculty to the topics selected. Faculty developed their own content outlines, which were submitted to the PNA in accordance with the application process for PNA approval to award continuing education credits. Information was also sent to Edinboro University's public relations office for the creation of a brochure to advertise the offerings.

FACULTY TRAINING
Faculty, support staff, and administrative personnel participated in a workshop at Clarion University to learn about the new technology, and local workshops were held to teach each presenter about operating the equipment and other issues related to program delivery. Essentially, faculty were encouraged to present their content as they would in a traditional classroom, with attention to the differences in preparing camera-ready visuals to augment audio content, positioning oneself relative to the camera, slowing and limiting body movement for effective interactive delivery, and discussing options should equipment failure occur during the presentation. Faculty were additionally responsible for the development of educational materials to accompany their presentations, as well as completion and submission of the content-related materials required for PNA approval to the program coordinators.
TABLE 1
PROGRAM COORDINATION TASKS

Interact with "key players" including audiovisual personnel, remote site coordinators, faculty, accrediting bodies, public relations and marketing personnel, and supervisors.

Identify topic(s) to be developed.

Select faculty.

Schedule times and locations.

Organize faculty training sessions.

Supply public relations and marketing personnel with relevant information and materials.

Initiate, organize, and follow through with application process to award continuing education credits to participants.

Provide support and consultation to faculty.

Develop complementary educational packets.

Transport promotional materials and educational packets to remote sites.

Identify necessary evaluation components and conduct evaluation.

Generate and distribute relevant reports.

TABLE 2
TOPICS INCLUDED IN THE PROFESSIONAL NURSING SERIES

- Electrocardiogram Interpretation: A Three-Part Program
- Nursing Care of the Grieving Family
- The Good Nurse: Concepts in Nursing Ethics
- Transformational Leadership
- Adolescents in Crisis
- At-Risk Kids
- Caring in Nursing
- Mentoring in Nursing

site coordinators show designated videotapes at the appropriate times. If participants were present at both origination and remote sites, multiple copies of videotapes could be purchased.

FACULTY-STUDENT INTERACTIONS

Creating rich faculty-student interactions via interactive television was as great a concern of faculty as it would be in face-to-face contact in the traditional classroom. One of the most useful strategies proved to be mapping students by name on a seating plan as they introduced themselves from the remote site. This allowed faculty to address students by name. Seeking interaction early in the program by eliciting participants' reasons for attending and their past experiences with the topic being presented engaged and relaxed participants.

THE TEACHING/LEARNING EXPERIENCE OF VIDEOCONFERENCING

While distance education as a tool for delivery of educational programs has existed in the form of telecourses and computer conferencing, videoconferencing offers the advantage of two-way audio-video interaction. It allows faculty and students to see and talk to each other during the broadcast, minimizing the impersonality and potential for misinterpretation inherent in other forms of distance education. For the uninstructed, however, the equipment and interactions inherent in videoconferencing may be somewhat daunting.

During broadcasts, both teachers and learners face a television-like monitor, topped by a videotape camera, and possess a control device which individuals at either site can use to focus on various aspects of the transmission. The control device also encompasses a keypad, similar to that of a touch-tone telephone, which is used to access telephone lines to initiate the broadcast. The system captures the audible and visi-
ble activity at the near and far ends of the transmission, respectively, which can then be witnessed by people at the opposite end via the monitor. Using the control device, viewers can see and speak to the people at the other end as they wish. A document camera is part of the equipment and can be used to transmit images such as traditional overhead projector material or other special exhibits.

The process of transmission of sounds and images results in some delays that are manifested by a blurring of images when they move rapidly and a four tenths of a second delay in sound transmission. The delay in sound transmission can result in students' questions being received when the teacher has begun talking again, if the teacher does not wait long enough. With practice, faculty learned to move more slowly and pause longer than usual to wait for questions and answers to be transmitted. Both faculty and students, after exposure, readily accommodated to these minor inconveniences and even adjusted to the initial impression of talking to a television set.

EVALUATION

Participants were asked to evaluate each offering according to three criteria:

- Quality of content.
- Relevance of content to program objectives.
- Effectiveness of teaching methods.

All participants evaluated each criterion for each of the offerings in the range of 4 to 5 on a 5-point Likert scale, where 5 = strongly agree. Approval was obtained from the PNA to award continuing education credits to participants.

DISCUSSION

The experiences of participants, coordinators, faculty, and technical staff indicate the time has come to expand the use of videoconferencing in nursing. Experience in producing the Professional Nursing Series found that distance education is effective with adult learners (Nichols, Beeken, & Wilkersen, 1994) and evidenced that this method of program delivery (traditional classroom versus teleconferencing) does not seem to lessen student achievement (Daly, McClelland, & Yang, 1994; Hoeksel & Moore, 1994). Indications are that it is both feasible and effective to offer diverse materials over compressed video.

Possible applications of videoconferencing technology include:

- Continuing education offerings.
- Courses for academic credit.
- Postclinical conferences when students have clinical experiences remote from the university.
- Entire baccalaureate and master's degree programs including clinical components with site coordination and preceptors at remote sites.

Other applications include meetings, conferences, or consultations with faculty or personnel from different settings or from satellite campuses of the same university. Videoconferencing technology also offers a way to add the expertise of national experts in health care to nursing curricula or problem resolution.

According to Armstrong and Sherwood (1994), "our fast-paced and rapidly changing health care system places many demands on schools of nursing to deliver improved and increased services to more people efficiently" (p. 175). Once a university has invested in the equipment for distance education, videoconferencing, with a reasonable hourly cost for use of the phone line during program delivery, becomes much more cost effective than reimbursing faculty for travel to deliver satellite programs at distant sites. With distance education technology, nursing programs can enroll more students from relatively remote populations, thereby addressing the problem of accessibility to higher education for many potential students, particularly the nontraditional student, and expanding the availability of nurses to care for remote populations.

REFERENCES


