EDITORIAL

Scholars, researchers, administrators, and students are invited to submit articles about distance education to DEOSNEWS. If your article is accepted, we would like to include your e-mail address so that the readers can contact you for questions and comments. We do not have any objections if you would like to publish the article in a paper-based journal later. Please send your articles to MFP101@PSUVM.PSU.EDU

COMPUTER NETWORKS FOR TEACHING AND RESEARCH: CHANGING THE NATURE OF EDUCATIONAL PRACTICE AND THEORY

Greg Kearsley & William Lynch
[kearsley@gwuvm.gwu.edu & blynch@gwuvm.gwu.edu]
School of Education & Human Development
The George Washington University
Washington, DC
In the past few years, the use of computer networks in education has gone from being a curiosity to a major component. Thousands of teachers and students are now using computer networks on a regular basis to learn and interact with each other. It is clear that networks have the potential to significantly reshape the way we conduct education. To date, however, there has been little analysis of the impact on teaching/learning strategies, curriculum, or the organizational structure of schools. In this article we will examine this impact in light of our own experiences using networks in the Educational Technology Leadership program at The George Washington University as well as research conducted by others on the topic.

The Ed Tech Leadership BBS

For the past 2 years, a bulletin board system (BBS) has provided electronic messaging and computer conferencing capabilities for the faculty and students in our Educational Technology Leadership program. At the beginning of each course, students are shown a videotape demonstrating how the bulletin board works and are encouraged to use it during the course. Sometimes we post assignments, quizzes or exams on the system but most of the time it is used for informal interaction between students and instructors. Access to the bulletin board is free and we provide an 800 number to allow people outside of the Washington area to sign on without incurring long distance charges.

Most of the students in the program are teachers or training professionals completing their Master's degree on a part-time basis. In general, they work during the day at full-time jobs and take most of their classes at night after work. Our students tend to be very busy and place a premium on their free time. Since they spend much of their day in a classroom teaching, they are often difficult to reach by telephone. While most of the students live within 20 miles of the main campus, they are not inclined to waste a lot of time commuting to classes. The bulletin board provides a convenient and efficient means for students to interact with faculty and each other.

There are a lot of interesting ramifications of providing a department or school wide network. Since we allow all students and instructors access to any course discussion, it is possible to participate in (or at least "browse" through) any course being conducted. Thus, the network breaks down the artificial walls we construct between different subjects or topics. Another aspect is that students or faculty can be active electronically in a course without actually showing up on campus for class meetings. This increases the geographical range of our courses and makes them attractive to students who would not normally enroll because of their distance from the university (or the hassle of commuting downtown).
Probably the most significant implication of using computer networks for teaching is that it can dramatically increase the degree of student-instructor interaction. Instead of a few questions during or after class, it now becomes possible for students to post questions on the bulletin board any time they wish. While this increased level of interaction is highly desirable, it places a much heavier load on the teacher since responding to student questions can consume many hours a week. If students are asked to complete assignments and submit them online, this means even greater demands on the instructor.

Students vary considerably in the extent and nature of their use of the bulletin board system. Some students tend to be more active, probably having to do with their social or verbal skills or their degree of comfort using computers. For example, some students prefer to turn in their assignments online while others stick to using the mail or fax. On the other hand, use of the system does not seem to penalize students who have limited verbal proficiency and who tend to say little in a live class. This is especially important for foreign students who may have difficulty with spoken English although their reading and writing ability is good.

One of the most significant factors that limits the use of networks by students and faculty is easy access to a computer equipped with a modem, preferably at home or at their office. Because not all students and faculty meet this condition, we can only make network activities an optional component of our courses. If the university would make it a requirement for all students to own a computer (as some institutions do), we could design our courses to rely on the use of network activities. Another possibility is that we could make ownership of a computer and modem a pre-requisite to course enrollment. So far we have not been willing to take this step since it could have the unwanted effect of screening out students.

A much more profound constraint on the effectiveness of networks in teaching and learning is becoming sophisticated enough about computers and networks to use them effortlessly. While the basic functions of reading and sending messages are not hard to learn, more advanced capabilities such as transferring files, rerouting messages, participating in conferences, and setting up electronic files take much more experience and affect the usefulness of the system. Similarly, learning what types of teaching techniques work on a network and modifying course activities to accommodate these techniques takes a considerable amount of experience. Until this experience is acquired, courses taken or taught using networks may not be very successful or rewarding.

We feel that teachers need to use computer networks as part of their professional activities in order to become comfortable enough to use them teaching. Like many university and college professors, we make extensive use of BITNET to interact with our colleagues around the country and world. BITNET adds a new twist to traditional research activities. For example, there are a number of electronic journals available for both reading and
contributing to. Contributions are simply typed or loaded into the system and sent to the editor for review. One of us is writing a book with an author at another institution and we use BITNET to send draft chapters back and forth for discussion. We have also used BITNET to submit conference papers and organize sessions. Since BITNET also serves as the electronic mail system for our own campus, it can be used to interact with local colleagues too.

Our campus network also allows us electronic access to the university library catalog. Students and faculty can sign on to the catalog and conduct searches of the entire library holdings (including periodicals). This is very useful when you are working on an article or preparing a course syllabus and need to check references. Of course, we also have access at the library to major online databases such as ERIC, PSYCHINFO, DIALOG, etc. While faculty and students can access such online databases directly, there are costs involved. Everything we have discussed in the rest of the article involves no usage charges -- one of the factors that is undoubtedly responsible for their success.

Implications

We believe the use of networks at GWU just discussed is typical of what is occurring at many schools and colleges around the country. One clearcut implication of networking in the school setting is the potential to change the curriculum, particularly in language and science classrooms (Roberts et al., 1990). When students use networks for class activities, those activities tend to be collaborative efforts that involve small groups collecting and sharing information with students at other schools. For example, in the Computer Chronicles project (part of the AT&T Long Distance Learning Network), students at each site created their own newspapers using stories provided by students on the network (Riel, 1985). In many cases, these projects involve cross-cultural exchanges. Project Orillas linked Puerto Rican students in the U.S. with students in Puerto Rico for the purpose of improving Spanish writing skills (Sayers & Brown, 1987). In the case of science, networks tend to focus attention on data collection. For example in the National Geographic Kids Network, middle school students conduct experiments in areas such as pollution or weather and share data with students at hundreds of schools around the world. While students learn about specific content areas, the emphasis is on having students actually do science and learn how to ask and answer scientific questions (Foster et al., 1988).

A second major implication of networks is the increased potential for distance education (Davie, 1988; Mason & Kaye, 1989). Distance education, i.e., learning situations in which the teacher and students are physically separated, is becoming increasingly popular because of the convenience and
cost-savings it affords. However, the greatest problem in making distance education work is providing a high level of interaction between students and teacher. Computer networks provide a means to achieve this high level of interaction and add new modes of teaching at a distance. For example, an online conference allows an extended discussion, spanning weeks or months, to be conducted with the possibility of involving "guest" participants from any location. Furthermore, use of a computer network encourages students in the class to interact informally, compensating for the lack of face-to-face social interaction in a classroom. Indeed, the degree of social interaction possible when a network is used in a course can be much more extensive than in a traditional classroom!

One of the very significant implications of the use of computer networks for distance education is the virtual elimination of geographic and time barriers to education. Since students make a local telephone call to link into a network, the actual location of the institution offering the course is immaterial. Because networks are available on a 24 hour basis, messages can be read and sent anytime. Colleges and faculty are no longer limited to serving regional populations; students no longer need to consider the proximity of a school to their home. Indeed many "electronic universities" are emerging that have neither a traditional campus or faculty. Students take courses at home or the office; faculty teach from home or their offices. In one scenario, an electronic university does not need to have its own faculty but offers courses taught by faculty from any school who are interested. This opens up the possibility of "freelance" teachers who offer courses at many electronic universities without belonging to a specific institution. So much for faculty parking and tenure!

A third implication of networks is the potential for "mainstreaming" handicapped and disabled students. Most of the problems that handicapped students have in school revolve around difficulties communicating with others. By using networks to interact, these barriers to communication are removed. For example, deaf students can freely participate in regular courses that use computer networks without any communication problems. Similarly, blind and physically disabled students can participate in courses that use networks by using personal computers equipped with special interfaces. There are also a number of online databases that provide information about special education resources (e.g., SpecialNet).

A fourth implication of network use is how they affect the professional development and collaboration of teachers. Earlier in this article we talked about the use of BITNET to share information with colleagues in higher education. A number of projects have established networks specifically for the purpose of teacher training and support. For example, the Bread Loaf School of English at Middlebury College in Vermont runs a network called BreadNET to allow teachers who participate in their summer writing workshops to interact on a continuing basis (Elder et al. 1989). Teacher-LINK is a network established by the School of Education at the
University of Virginia specifically to support student teaching activities (Harris, 1989). A similar network for the support of beginning teachers is being used at Harvard University (Beals, 1991). The National Education Association in conjunction with IBM Corp. has implemented a large computer network that links many schools and teachers around the country specifically for the purpose of teacher interaction. These efforts are important because school teachers are often very limited in their opportunities to interact with each other and educational researchers. Networks provide a way of sharing the collective experience and wisdom of teachers at all levels and locations.

Issues

There are many issues that need to be addressed as computer networks become more popular in education. One important issue is the design of networks to facilitate group interaction. As Feenberg & Bellman (1990) state: "Computer Mediated Communications creates electronic social enviroments as complex and socially specific as the interiors designed to serve the different types of social activities that go on in face-to-face settings." (p. 68) In other words, we need to think about the design of computer networks in ways that are conducive to group interaction. Another design issue has to do with creating telecommunications software that is easy to use but also powerful and rich in terms of features. Because students may be at varying levels of computer sophistication, we need software interfaces that can accommodate both novice and experienced users.

Interconnection among networks is also an important issue. There are literally hundreds of local and national networks that we would like to link up with from our GWU bulletin board system. But each system involves a different user interface and operating system commands. While it is not technically difficult for us to connect up with different networks from our bulletin board system, it is unrealistic for us to learn and remember how to use each one. We need software that will automatically translate from one system to another and allow us to use many systems without the need to become telecommunications experts.

Changes to teaching strategies and curriculum raise a number of issues. The use of networks results in a highly participatory and collaborative learning environment. Teachers or students who are uncomfortable with this type of environment will not find networked classes very enjoyable. Most class activities conducted in a network setting are relatively unstructured and this may make them difficult for some students. In addition, participation in networks requires good reading skills -- students who are poor readers will be at a disadvantage. Certain topics and techniques that work well in a regular classroom may not work in an online class and vice-versa (Hiltz & Meinke, 1989; Phillips, Santoro & Kuehn,
So, teaching and learning via a computer network requires experimentation on the part of teachers and students. Earlier in this article we alluded to some of the administrative issues that computer networks introduce. For example, campus classroom facilities become less important; computing facilities and electronic access to resources become paramount. User support is a critical consideration. For example, students often have problems using our bulletin board system and need help. We have a full-time lab assistant who maintains the system and provides assistance. Without this assistant, it is unlikely that we would be able to provide satisfactory support to our students in using the BBS. We rely on our campus computing services for assistance using BITNET or the online library catalog. If we were to expand our use of networks to include gateways to other systems, we would depend upon these services for technical support and training. Historically, departments have been the main administrative unit in higher education; the use of networks could change this situation.

Class size is another significant issue. Because of the high level of interaction involved in an online course, a single instructor can only handle a small number of students (typically 10-15) -- even though in principle, there is no physical limit on enrollment size. This means that the teaching load for online courses is heavier than a traditional class with the same number of students. If large class sizes are allowed for online courses, instructors need teaching assistants or team teaching arrangements. Instructors also need to learn strategies for handling the high level of interaction typical of online courses. This includes redirecting questions back to students, grouping similar questions together for a single response, and encouraging concise messages.

There is also the question of costs. Is it reasonable to expect students to provide their own communications hardware and software needed to participate in online courses? Should off-campus students pay as much tuition as on-campus students despite the fact that they do not use campus facilities? Should on-campus students subsidize the costs of the computing resources used to deliver networked courses to off-campus students? Who should pay for the usage costs when we connect with commercial networks or databases? Clearly, a rethinking of traditional education financing is needed for online education.

Conclusions

Computer networks are creating new instructional paradigms at all levels of our educational system. Networks change the way we teach and learn, result in curriculum restructuring, and provide new educational opportunities for certain kinds of students. At The George Washington University, we have watched our education courses evolve due to the use of computer networking.
We believe that this evolution will ultimately have a broad impact on the university in terms of how classes are taught, who teaches, and the composition of the student body. These changes reflect an overall transformation in our educational system as it assimilates the new possibilities of the information age.

References


------------------- End of DEOSNEWS Vol. 1 No. 18 ----------------