Technology and Teacher Education Annual —1993—

Using technology in the classroom: Today and tomorrow

Tony Mitchell
St. Cloud State University

Marcin Paprzycki
The University of Texas of the
Permian Basin

Introduction

It is expected that the present educational system respond to the current needs of society. Education should also predict what society's future needs might be. One such current need is for individuals, upon completing their education, to be computer literate. If this is the case, one should expect teachers to be computer literate as well. The first part of this paper will examine the extent to which computer literacy is a part of teacher preparation. Second, a course which includes both traditional and newer uses for computers in educational settings is proposed. Finally, the role of computers in the classroom of the next century is discussed.

Present and Future of Computers in Education

The impact of computers on education is twofold. The first impact is in using computers to support the actual teaching process directly (Blomeyer and Martin, 1991). The second impact comes through the application of computer networks in the educational process. The number of networks devoted to elementary and secondary schools has grown rapidly in recent years. A current list of K - 12 projects is available via anonymous FTP (File Transfer Protocol) from nyser.org, in the sub-directory CoSn/cni-draft-packet. The increase in the usage of computers as communication tools has also resulted in the development of the CBEHIGH discussion list (listserv@BLEKUL11.BITNET or listserv@CC.KULEVE.AC.NE) which focuses on issues related to computers as a tool in higher education.

The accessiblity and range of computer networks, both in subject content and the ability to transverse the globe (Updegrove, Muffo, Dunn, 1991; Mitchell and Paprzycki, 1991) has led many people to realize that computer networks constitute a new medium called cyberspace or virtual reality.

Knowing how to include networks, whether they are local networks that enable students to keep in contact with the professor or networks by which courses for credit at one university or college are taken by students at other localities, is just as critical as the more traditional usages of computers in the classroom (Paprzycki and Mitchell, 1992). To assess the computer backgrounds of prospective teachers, we decided to determine what were the current computer literacy requirements for teachers in the United States and how such requirements match their professional needs.

Computer Literacy Requirements for Teachers

In the period between January, 1992 and the present, computer network based discussion lists (AETS—Association for the Education of Teachers in Science; CNEDUC—Computer Networking Education Discussion; DEOS—Distance Education Online Symposium; DTS—

Dead Teachers Society; ERL—Educational Research List; CTI—Computers in Teaching Initiative; NEWEDUC—New Paradigms in Education List; IPCT—Interpersonal Computing and Technology) were used to ask two questions:

1) Is there a computer literacy requirement for prospective elementary and/or secondary teachers in your state?
2) If the answer to the above question is yes, how is that requirement met (through course completion, competency, etc.)?

A total of four mailings were made. The second, third, and fourth mailings contained a summary of earlier results with the request for additions and/or corrections. Thirty-six (36) replies were received.

While this is a relatively small number of replies, there is some validity to the data collected. First, the inquiries were sent to lists directly related to the topic. Thus, respondents could be considered "experts" in this area. Second, since there were multiple mailings and each subsequent mailing summarized the results obtained to that point, there would have been no need for a person from a state to respond if that state were represented. When there was more than one response from a specific state, it was to discuss requirements at individual schools. From this, we would expect the data gathered to be accurate.

The results of the investigations can be summarized as follows:

1) At least ten states (Alabama, Colorado, Massachusetts, Michigan, Minnesota, New York, Pennsylvania, Ohio, Virginia and Washington) do not have a computer literacy requirement for teachers.
2) Kentucky, Indiana, South Dakota and Texas do have specific computer literacy requirements. These requirements can be met by passing a
a) standard programming course,
b) course designed around the use of word processing, data base, and spreadsheet software,
c) a course designed to evaluate, use, and incorporate education software into classroom use.

Several universities (Bowling Green State University, California State University - San Marcos, Colorado College, Miami (Ohio), Eastern Washington University, Memphis State University, Ohio State University, St. Thomas University, University of Alberta, University of Central Florida, University of Georgia, University of Iowa, University of Missouri - Columbia, University of Northern Iowa, Wright State University) have their own computer literacy requirements similar to point 2 above.

These results suggest that there are at least three different definitions for the term computer literacy. A person is considered computer literate if she/he:

1) is able to do simple computer programming;
2) is capable of using basic software packages;
3) can use computers as a tool in the workplace.

It is apparent that there are several factors which determine the definition for computer literacy. If the definition of computer literacy is accepted as the ability to use the computer in appropriate job settings (Gupta, 1992), then the results of this study indicate that many teachers are not computer literate. Results of the survey also show that very little consideration is given to teaching prospective teachers how to incorporate new technologies into the teaching process. Except on rare occasions, teachers are either not prepared to introduce computer usage in their future classrooms, or they receive a rather misguided preparation for doing so. One cannot expect a teacher to use Pascal (or any other standard programming language) to write his/her own software. It is also equally difficult to expect somebody only exposed to use of basic computer tools to be able to find a way to introduce them into the educational process.

When computers were first introduced, it may have been logical to expect people to utilize them by writing programs. However, because of how computers are now used and the rapid changes in computers since their introduction, this view should be discarded. Also, because of how computers are used, it may necessary to offer two different types of computer literacy courses. The first course would focus on basic skills, such as using word processing, database, and spreadsheet programs. The second would deal with skills needed for future work and would be dependent on the student's major and projected future employment.

A Computer Literacy Course For Teachers

As applied to the preparation of teachers, this second course would concentrate on all aspects of using the computer as a classroom tool. Such a course will be offered at St. Cloud State University during the Spring Quarter, 1993. It will consist of four parts: evaluating software, evaluating hardware, examining the use of authoring software, and using computer networks. See Appendix 1 for a copy of the course outline.

The first three parts of the course are in some sense repetitions of already established educational uses for computers. Educational software, like any software, can range from very good to very bad. It also ranges from simple drill-and-practice types to complex simulations. Students in the class will learn how to evaluate software, what criteria to use and how to apply such software in their classrooms. The second part will be primarily directed towards prospective secondary school teachers and upper level elementary teachers. Students will evaluate current hardware and design experiments where computers are used to gather experimental data. The third

part of the course is based on the belief that if teachers are expected to do any programming then the level of authoring software is appropriate. It is the fourth part of the course that requires more discussion.

Computer Networks as a Part of Computer Literacy

There are a number of reasons for including network based communications into a computer literacy course for teachers. Computer networks can be used directly in the classroom to facilitate teaching (Paprzycki and Mitchell, 1992). Through the use of FTP, students and teachers can obtain public domain software, technical reports, and papers. Listservs can serve both as a means of communication between groups in a number of ways. The preparation of this paper and other recent papers by the same authors (Mitchell and Paprzycki, 1991; Paprzycki and Mitchell, 1992) was done virtually through the use of e-mail. The number of journals published only (or primarily) in an electronic form is constantly increasing—fully refereed PSYCOLOQUY, with an electronic readership of apporximately 20,000 and Post Modern Culture, reprinted by Oxford University Press, are examples of such journals.

As was indicated at the beginning of the paper, the use of electronic mail can also be used to facilitate research. When used interactively, computer networks can facilitate communication between students from different schools/localities/countries. This approach can then be used to support a variety of science projects (for a description of a project which can be adapted to computer communication, see Mitchell).

The globality of computer networks allows for the development of a multicultural approach. Recent changes in the world suggest that a teaching approach based solely on textbooks and limited to the physical classroom will quickly become outdated. Computer networks provide the classroom teacher with a means to provide his/her students with connections to this rapidly changing world. There are several projects oriented towards communication between individuals, both teachers and students, of various countries. Among these projects are KIDLINK, KIDCAFE, and Project IDEALS. Many countries also require that their students be computer literate (O'Lander, 1992). Therefore, by showing students how to use their computers as a communication tool, it would be possible to increase their multicultural awareness and, at the same time, reduce cultural differences (Ryan, 1992).

The Next Step in Education

The use of computer networks opens up several other possibilities which take education beyond the real classroom and create what can be called "virtual" classrooms. Computer based classes are not a new idea. A

variety of courses, seminars and workshops are currently taught over computer networks. Combining together all of these offerings could lead to the creation of a virtual university (Palmer, 1992). Palmer has suggested that almost all functions of the university can be carried out over computer networks and suggested a possible organizational form for such a school. It should also be noted that Palmer is carrying out much of his discussion via another electronic journal, Thinknet.

While his disussion is purely theoretical, Jyrki Kuoppala from Helsinki University of Technology is attempting to create the Usenet University. This "society of people interested in learning, teaching and tutoring" will operate in cyberspace and be facilitated by usenet-type communications (Kuoppala, 1992). While there may be some resistance to this approach, there must be some consideration given to such unorthodox educational approaches if education is to teach all individuals in tomorrow's society.

Conclusion

It is a given fact that today's society is becoming increasingly computer oriented and that individuals need to be computer literate. It may be argued that teaching will always require a personal touch and that touch can only be arrived at by the physical presence of the teacher in the classroom with the student. However, the changing nature of both society and the learner along with the rapid growth of knowledge suggest that alternatives to traditional teaching need to be considered.

If schools of tomorrow are expected to prepare graduates of those schools to use available technologies, then teachers need to be prepared to be responsible for that education. Such preparation must include all facets of the computer as a tool. This includes the use of computer networks as well. It is our belief that, even though this is not the only possible solution, the course we are developing is a step towards addressing the needs of society.

Appendix 1

1. Course content
   a. Computer based communications
      i. Using main-frame computers to communicate
         (1) E-mail
         (2) Listservs
         (3) Conferencing
      ii. Transferring files
         (1) Obtaining public domain information
         (2) Ethics of using public domain information
      iii. Activities
         (1) Personalize an e-mail message
         (2) Send an e-mail message to someone on campus; send an e-mail message at a second location (off-campus).
         (3) Obtain a list of lists from the VAX at NDSU.
         (4) Subscribe to a listserv of own choice.
         (5) Obtain a document from another location via anonymous ftp.

   b. Evaluating software
      i. Types of software
         (1) Tutorial
         (2) Guided simulation
         (3) Exploratory
         (4) Cognitive tool
      ii. Evaluation guidelines
         (1) Use of graphics
         (2) Motivation of learner
         (3) User interface
         (4) Feedback
      iii. Activities
         (1) Using identified guidelines, evaluate selected software for each type of computer system available (Apple, MacIntosh, and IBM).
         (2) Prepare lesson plans showing how to use each type of software in a classroom setting.

   c. Evaluating hardware
      i. Activities
         (1) Using identified guidelines, evaluate selected hardware for each type of computer system available (Apple, MacIntosh, and IBM).
         (2) Prepare lesson plans showing how to use each type of hardware in a classroom setting.

   d. Evaluating/using authoring programs
      i. Activities
         (1) Prepare lesson plans showing how to using an authoring program in a classroom setting.

References

Blomeyer, R. L. & Martin, C. D. (1991) *Case Studies in Computer Aided Learning.* London: The Palmer Press.

Gupta, G. K. (1992) Computer Literacy at Small Liberal Arts Colleges. *Journal of Computing in Small Colleges, 7,*(3), 122-128.

Kuoppala, J. (1992) Electronic personal communication.

Mitchell, T. (in press) Was Eratosthenes Correct? A Multi-Class Science Project. *The Science Teacher.*

Mitchell, T. & Paprzycki, M. (1991) An Overview of Computer Networks in Education: Computer Networks and Network Services. *Journal of Computing in Small Colleges, 6,*(5), 1-8.

O'Lander, R. (1992) A Multicultural Approach to Computer Literacy. *Journal of Computing in Small Colleges, 7,*(3), 133-137.

Palmer, K. (1992) *Thinknet, 1,*(3).

Paprzycki, M. & Mitchell, T. (1992) An Overview of Computer Networks in Education: Using Computer Networks in the Classroom. *Journal of Computing in Small Colleges, 7,*(3), 27-33.

Ryan, R. (1992) International Connectivity: A Survey of Attitudes about Cultural and National Differences Encountered in Computer-Mediated Communication. unpublished manuscript.

Updegrove, J. A., Muffo, J. A., Dunn, J. A. (1991) Electronic Mail and Networks: New Tools for University Administrators. *Cause/EFFECT, 13,* 41-48.

Tony Mitchell is an Assistant Professor of Chemistry, Department of Chemistry, St. Cloud State University, St. Cloud, MN 56301, email: tmitchel@tigger.stcloud.msus.edu

Marcin Paprzycki is an Assistant Professor of Mathematics and Computer Science, Department of Computer Science, The University of Texas of the Permian Basin, Odessa, TX 79762, email: m_paprzycki@utpb.pb.utexas.edu