Technology and Teacher Education Annual, 1994

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Proceedings of *STATE 94*—

Fifth Annual Conference of the
Society for Technology and Teacher Education

Washington, DC; March 16-19, 1994

Using Computer Networks to Study Computer Literacy

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The development of global computer networks has given researchers the means for rapid communication of ideas. It broadens the scope of research to a point that allows it to be carried on from any place with a link into the network. It has also the potential of reducing time of just collecting and assembling data to a few weeks. Based on the earlier experience with using computer networks to collect the data (Mitchell & Paprzycki, 1993b) the authors decided to try to apply a similar approach to study the present state and future of computer literacy.

This paper will serve two ends: describe the methods used to gather the data (as well as certain possible pitfalls) and present preliminary results.

Computer Network Based Research

Starting in 1991, two authors of this paper (Mitchell & Paprzycki) have collaborated on research projects while separated by more than two thousand miles and communicating primarily using e-mail. This cooperation led to publication of three papers and two notes as well as to a number of conference presentations (Mitchell & Paprzycki 1992, 1993a, 1993b, Paprzycki & Mitchell 1992a and 1992b). In 1992 we received an inquiry from Duckett abou the possibility of getting copies of the publications to assist him in his research. We found there were common goals in the research and agreed to combine projects into a collaborative work in the area of computer literacy.

During the school year 1992/93, we communicated exclusively through e-mail in order to develop a two-part survey. Based on earlier experience we have developed a practical way of preparing manuscripts. Essentially, one of the three authors would draft a part of the text and then senc it to the others for comments. The next in line would make his own comments and send it to the third who, after making his improvements, would then return it tothe original drafter. This iterative process was then repeated until a satisfactory stage was reached.

Data Collection

There is a number of issues that need to be addressed when attempting to use computer networks to collect data. First, size of the survey — if the instrument is too long, ther people will not be ready to spend the required time to answer all questions. This can not only reduce the number of returns but some of the returns may come back only partially filled–in. Feeling that it would take too long to complete the full instrument we had developed, we split it into two parts. In part one we requested people to declare if they wanted to participate in the second part of the survey. Those who affirmed participation were contacted individually.

The second issue is related to the distribution of the instrument and data collection. We decided to use electronic discussion groups to distribute the instrument. To eliminate confusion and anxiety, for all parties, when sending a survey to a large number of lists, we recommend the following procedures be used (for further technical details see Mitchell et. al. 1993):

1) subscribe to each list to be used,

2) send your message with a note to the moderator about what you are trying to accomplish,
3) request that the responses will be send directly to you,
4) watch for you message to appear on the list,
5) wait a few days to see before you un-scribe from the list.

Methodological Issues

There exist important benefits of using computer networks to collect the data. First, a questionnaire can be distributed to a specific group of individuals in a short period of time. Second, returning lengthy questionnaires is also made easier. And finally, the process of assembling the data (e.g. into a database) can be easily automatized.

There is, however, a question: "will such an approach work as a research tool?" The basic problem that was observed, which is also inherent to all survey research, is the small rate of return (establishing the true ratio of responses to the total number of instruments sent is even more complicated by the fact that one individual may be a member of several lists and thus counted many times). Unfortunately there is almost no way to control this factor. The only possible solution that we see is to use a Delphi–type approach (Melton, 1997) which we have employed already in an earlier study (Mitchell & Paprzycki 1993b). After some time the survey's data is compiled and sent back to the lists that were used initially (and possibly to additional, sometimes newly created, lists) with a note that readers can contact the authors for copies of the survey report. This procedure can be repeated at certain intervals to increase the total number of responses collected as well as to study possible changes in the response patterns.

It has been suggested that using computer network based surveys is a "scatter–shot" approach and as such it is not a very wise approach. However, we would argue that if the survey is very specific in nature and is directed to groups likely to be subscribers to the lists used to distribute the survey, then it is not a "scatter–shot" survey.

It is also possible to argue that when conductingsurveys via networks, a portion of the sample population is eliminated. This is a valid comment; many groups cannot be effectively sampled through electronic lists because few members of those groups use lists. However, the validity of this criticism decreases as the number and diversity of people connected to the networks increases (notice the rapid growth of Compuserve and other commercial systems that provide users with access to the global computer networks). For a detailed discussion of the methodology-related issues see Mitchell et. al. (1993).

Computer Literacy

Previous research indicated that computer literacy means various things to different people (Duckett, 1992, 1993). To those not formally trained in computer science, it very often means the ability to use a computer to fill their needs. On the other hand, some computer science educators tenaciously hold on to the concept that to be computer literate you must be able to read and write programs written in one of the programming languages. To eliminate any possible conflict that might arise by using the term computer literacy, we elected, for the purpose of the survey, to use the following definition based on Duckett (1992):

To be computer literate a person would have comprehensive skills, knowledge and understanding of computers and their use as they relate to technical, ethical, social and educational issues of the day.

As each discipline of study has specialized requirements, a global definition can extend no further than stated above. It is therefore the responsibility of each discipline to define the extent of skills, the level of knowledge and understanding of the use of computers, to be determined by each discipline, within its sphere of influence (Duckett, 1993).

Research objectives

In conducting this study, we sought to further identify what states, provinces, and/or countries required teachers to be computer literate as a requirement for certification. We also wanted to identify components of a possible computer literacy course for prospective teachers. To achieve this goal, a two-part survey was developed. Part one was designed to collect specific information about computer literacy requirements in place for teachers upon entering practice as well as support provided by the colleges to satisfy these requirements. In part two we attempted to establish the components contained in the computer literacy requirements, how people value the importance of these components, and what they perceive computer literacy should consist of (contact the authors for a copy of the surveys).

Results of the survey

The results of this study are divided into two parts, computer literacy requirements and the nature of computer literacy education. As in our earlier study (Mitchell & Paprzycki 1993b), we found that most states do not require teachers to be computer literate. Only respondents from Brazil, Puerto Rico, and the states of Indiana, Mississippi, North Carolina, Tennessee, Utah, Wisconsin, and the District of Columbia indicated that computer literacy was a requirement for teacher certification. [We know from other sources that other states, such as California, also have computer-related requirements for certification.] The results also suggest that this area is of limited concern for future certification processes.

In part two of the study, we sought to examine the current emphasis placed on computer education and what respondents felt the preferred situation should be. Based on a chi–square analysis, there was a significant difference between the current and preferred situations for 26 of the 27 questions. These differences lead to the following conclusions:

1) Whenever possible, computers should be incorporated into the curriculum and students should be encouraged to develop the appropriate computer skills. This indicates that teachers need to have comparable skills and understand how the computer can be part of the curriculum.
2) Computer literacy should be a necessary part of the teacher certification process and should be included in pre–service course work.

Based on the responses, computer education courses for pre-service teachers should encompass:

A) a study of the relationship of computers and society, including a consideration for the ethical use of computer software (copying, piracy, etc.),
B) a study of common word processing, data base, spreadsheet, desktop publishing, graphics, and authoring software packages (but not programming languages!),
C) usage of computer networks and electronic mail,
D) usage of computer as part of the learning process, a means for measuring educational outcomes, and the administrative process,
E) means for evaluating hardware and software.

These results confirm also the need to redefine the term computer literacy from its original programming basis to a more user-defined basis.

Conclusions

As society changes so does the definition of what it means to be computer literate. The data has also indicated that a serious change in the teacher preparation as far as computer proficiency is concerned is necessary to meet the new perception of computer literacy. If teachers are to help their students better use computers in their daily lives, they (the teachers) have to be computer literate, and this means they should have the appropriate skills before entering the classroom.

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