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**COMPUTER LITERACY/COMPETENCIES: PREPARING
TEACHERS FOR THE INFORMATION SUPERHIGHWAY**

Marcin Paprzycki

*Department of Mathematics and Computer Science
The University of Texas of the Permian Basin, Odessa, TX 79762
m_paprzycki@gusher.pb.utexas.edu*

Tony Mitchell

*Department of Chemistry
St. Cloud State University, St. Cloud, MN 56301
mitchel@tiger.stcloud.msus.edu*

George Duckett

*Faculty of Education
Deakin University, Burwood Campus, 221 Burwood Highway
Burwood, Victoria 3125, Australia
gduckett@deakin.or.au*

INTRODUCTION

The discussion of the Information Superhighway and the increased role of computers in all areas of life show how important it has become for children to be prepared for the fast changing world. It is also obvious that if we wish children to become computer literate, their teachers must be computer literate as well. At the same time, the meaning of the term "computer literacy" appears to be changing as fast as computer technology itself (see Duckett, 1992).

The initial definition of computer literacy was based on one's "ability to program". This was useful definition for its time because the computers one initially used were essentially main-frame computers. However, the rapid development of the personal computer and off-the-shelf software along with their introduction into the classroom has quickly made that definition out-moded. Even now, there are very few classroom applications which require being able to write simple programs for use on main-frame computers. The rapid development of computer software for the classroom has quickly gone beyond the capabilities of even the most experienced teacher. 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.

Since 1992, we have been involved in studying various aspects of computer literacy and its application to teacher education (Mitchell & Paprzycki, 1993; Paprzycki, Mitchell & Duckett, 1994). In this paper we present the results of our current study on the perception of the role of computer literacy as it relates to teacher preparation and discuss the implications these results have for teacher education.

SURVEY METHODOLOGY

During our studies, we took advantage of the increasing use and availability of global computer networks. We used selected listserve to disseminate our survey questionnaires. To increase the number of responses, data was collected twice (during early fall, 1992, and late spring, 1993). Because of the length of the survey, it was split into two parts with the first part being sent to the selected listserve and the second part being sent to interested individuals. A detailed description of the research methodology has been previously discussed (Mitchell, Paprzycki, & Duckett, 1994).

SURVEY RESULTS

Responses to our questionnaires were received from 12 countries (Australia, Brazil, Canada, Germany, Ireland, Israel, New Zealand, Poland, Puerto Rico, South Africa, Turkey and the United States). A total of 76 individuals responded to the first part of the survey; 69 responded to the second part of the survey. Fifty-eight of the 76 participants (76%) were teachers or lecturers. Sixty-five were involved at the university or college level with an average of 17 FTE (full-time equivalent) in the various departments. Approximately 30% of the teaching load (5 of the 17 FTE) for those at the university or college level dealt with courses dealing with "Computers in Education" issues. Approximately 70% (52) of the participants had some form of training with computers or with "Computers in Education" issues.

The respondents indicated that there are limited requirements for individuals to be computer literate prior to becoming certified. Nineteen of the respondents, 25%, indicated that there was a computer literacy requirement for teacher certification; 15, 20%, indicated that computer literacy was at least recommended. Twenty-one, 28%, indicated that a computer literacy requirement was not being considered at this time. The remaining participants did not indicate the status of computer literacy or competency as part of the certification process.

These results are consistent with results from our previous study (Mitchell and Paprzycki, 1993) which indicated that computer literacy was not a high priority in teacher certification. It was also indicated, see Table 1, that teacher education programs are becoming aware of the need for prospective teachers to be computer literate or show some degree of competency in the use of computers in classroom settings. This result is also corroborated by the data in Table 1 where there is a clear concern that computer literacy be a part of teacher education programs and even more so as a general education requirement (see also Table 2, questions 1 - 3).

Participants in the study were asked to indicate the degree of their current situation with regards to the learning of skills and/or knowledge of the subject as it is currently being taught and how they would prefer it to be taught. The results indicate that there is a shift from a marginal inclusion of computers in the curriculum to a major incorporation of materials (see Table 2).

In the second part of this study, we sought to identify the specific parts of the computer literacy definition. As indicated in Table 3, respondents felt that computer usage and the inclusion of computers into the overall curriculum is a low priority at the present time. Respondents also indicated that there should be a high priority on such usage. The results also suggest that part of this curriculum should be prior to pre-service teacher programs, i.e., the general education curriculum. Finally, with respect to teacher education programs, the results suggest that there should be a shift from the development of an understanding of the computing process (programming languages and the physical setup of computers) to one of

an understanding of how to use computers in a number of settings. Also, teachers should be able to evaluate software for its application to education settings rather than being able to prepare or develop such software.

CONCLUSIONS

The results of this study confirm the need for an expanded definition of computer literacy. It is clear from the results in this study (see Table 2, questions 6 and 7) that respondents feel that computers should no longer be viewed as a primary focus but within the context of classroom tools. Computer literacy must be now be defined in terms of competencies, i.e., how the individual will be using the computer. This in turn means that no single course (which could do more than briefly describe all of the uses and provide for little competence in any single area) would be appropriate. Rather than a single all-exclusive course, two separate courses must be developed. The first would focus on basic skills, such as using word processing, database, and spreadsheet programs, and would be offered prior to the beginning of a student's professional courses.

The second course would deal with skills needed for future work and be dependent on the student's major and projected future employment. This course would be part of the professional course sequence. The contents of this course would be determined by the nature of the major. In terms of teacher education, the resulting focus would be on the uses of computers within the classroom.

The recent discussion in the United States for an information superhighway will have a dramatic impact on teacher education. It has already been documented that many teachers have to turn to their students for information about computers. The results of this study suggest that the current emphasis on computer literacy does not match the direction computer usage will take in the coming years. The results also suggest that teacher education programs should focus on the development of skills that allow teachers to use computers more effectively and efficiently. This in turn will require a more adequate definition of necessary competencies.

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Table 1

Level of concern	Great concern	of some concern	concern	little concern	no concern	no answer
in general	26	22	11	12	1	4
as part of teacher education	18	23	11	14	2	8

Table 2

Key to responses
 1 = No emphasis
 2 = A little emphasis
 3 = Moderate emphasis
 4 = Strong emphasis

	Currently Taught				Prefer to See Taught			
	1	2	3	4	1	2	3	4
1) The use of computers in education is incorporated into curriculum studies where applicable.	10	33	18	6	1	0	16	50
2) Computer literacy as a requirement for teacher certification.	34	18	11	5	4	5	27	32
3) Computer literacy as a required subject for pre-service teacher education.	30	23	4	10	4	5	20	38
4) Students are encouraged to learn computer skills in their own time.	9	26	25	9	3	9	28	29
5) Students are taught computer skills as part of course work.	10	32	18	9	2	2	19	46
6) Students are encouraged to use computers whenever it applies.	13	28	19	9	1	0	16	52
7) Students are encouraged to word process assignments in preference to turning in hand-written ones.	5	32	19	13	1	3	18	47

Table 3

Key to responses
 1 = No emphasis
 2 = A little emphasis
 3 = Moderate emphasis
 4 = Strong emphasis

	Currently Taught				Prefer to See Taught			
	1	2	3	4	1	2	3	4
8) ... influence and impact of computers on society.	21	28	18	0	4	11	33	19
9) ... software applications	8	25	24	12	0	5	24	39
10) Requiring pre-service teacher education students to be computer literate upon entry into service teaching	19	25	17	7	2	2	24	39
11) ... setup computer equipment and load software.	21	29	11	8	1	10	29	29
12) Knowledge and ability to use a computer network.	29	24	10	5	5	12	31	20
13) Develop the knowledge of and the ability to use e-mail.	27	20	15	7	2	3	25	39
14) Legal implications of software copyright abuse.	30	26	10	3	6	8	30	25
15) Use of computers and software in the curriculum.	17	27	14	10	3	5	15	45
16) Using computers as an administrative tool.	20	31	15	2	6	9	24	29
17) A criteria to measure the competence of computer usage.	36	18	7	3	7	18	22	17
18) The effect of computers on education outcomes.	27	32	7	1	7	18	25	17
19) The use of the computer as a teaching tool.	18	27	18	3	4	3	19	39
20) Using computers to solve problems.	23	29	12	5	1	4	32	31
21) What is a computer and how does it work?	27	26	14	2	3	29	31	6
22) Evaluation of educational hardware and software.	32	24	8	5	0	9	33	27
23) Ability to use an authoring software package.	33	19	10	4	5	14	23	21
24) Emphasis on the study of high level computer programming languages	19	25	11	13	12	14	15	25
25) Documentation of instructional software	24	33	8	2	7	16	26	17
26) The use of computer-assisted instruction.	23	35	8	0	6	10	36	14
27) The use of computer-managed instruction.	24	24	11	5	5	13	31	15