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ABSTRACT

This study investigated the effects of quality of educational experience with computers on attitudes toward computers and learning in a preservice educational psychology class for deaf students training to be teachers. Nineteen subjects used computer-assisted instruction modules for seven half-hour lessons on various educational psychology concepts. The majority of the students had positive reactions to the quality of the lessons, the computer feedback, the time allowed to complete the lesson, and the teacher's instruction. Using the Computer Attitude Scale, it was determined that students' attitudes toward computers changed in terms of reduced anxiety and greater confidence in using computers. Students' knowledge of educational psychology concepts increased after completion of each lesson. The results provide support that, if the nature of the students' computer experience is positive, then attitudes can be positively impacted. (Includes 23 references.) (JDD)

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THE INFLUENCE OF COMPUTER EXPERIENCE ON ATTITUDES AND LEARNING FOR PRESERVICE DEAF TEACHERS

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A limited number of variables have been studied that impact on attitudes toward computers. Primarily, researchers have investigated the relationship between gender, age, and amount of experience with computers on attitudes toward computers (Fann, Lynch, & Murranko, 1989; Loyd & Gressard, 1984a; Mackowiak, 1988-89; Mertens & Wang, 1988). Results of these studies have consistently reported that gender and age are not significantly related to attitudes, but that amount of experience is. None of these studies attempted to control the nature or quality of the students' experience with the computer. Therefore, educators are left with a "black box" understanding of the relationship. Generally, amount of experience is related to positive attitudes, but what is the nature of the experience that affects such attitudes?

This question takes on more importance with the realization that the use of microcomputers in deaf education is increasing (Braden & Shaw, 1987). Deninger (1985) reported that all residential programs serving deaf children report that they are either using computers or are planning to get them. The attitude of the teachers toward computers is important because the primary factor affecting adoption of instructional innovations, specifically computer-based instruction, are attitudinally based (Fahy, 1985). Based on a large survey of hearing undergraduate students, Fann et al. (1989) concluded that if individuals do not believe that they can interact successfully with computers, they most likely will avoid computers no matter how useful the computers may be.

The microcomputer has been described as the most anxiety-producing innovation among teachers that has been studied in the past two decades (Quinsatt, 1981; McNeil, 1983; Meister, 1984). Teachers are frequently afraid of the complex, technical nature of the microcomputer (Martin, 1988). Teachers-in-training typically do not receive adequate experience in working with computers (Lindenau, 1984; Oates, 1985; Rose & Waldron, 1983; Simpson, 1984). Isrealite and Hammermeister (1986) reported that less than 20 percent of the teacher training programs for deaf students included instruction to establish basic computer literacy and training in computer applications.

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The purpose of the present study was to investigate the effects of experience with computers on attitudes toward computers and learning in a preservice educational psychology class for deaf students training to be teachers. The investigation focused on the quality of the educational experience and its impact on attitudes toward computers and learning of educational psychology concepts.

Method

Subjects. A total of 19 preservice deaf teachers participated in the study as a part of requirements for an undergraduate course in educational psychology. Of these, 10 were male and 9 were female; all but one of the students was white. Eighty-six percent of the students were juniors or seniors with an average age of 23.89 years. All of students were either severely or profoundly deaf. The majority of the students (79%) had more than six months of experience with computers prior to the study and the overall grade point average for the group was 3.05.

Materials and Procedures. The subjects completed a demographic questionnaire about their characteristics and experience with computers. Nine-item rating forms were completed after each computer-based lesson that asked about students' attitudes toward the software, problems encountered, and their perceptions of the role of the teacher and their peers. Pre and post measures were obtained at the beginning and end of the semester using the Computer Attitude Scale (Loyd & Gressard, 1984b). This instrument provides scores on three subscales: Computer Anxiety, Computer Confidence and Computer Liking. Loyd and Gressard reported reliability levels of .87, .91, and .91 for each of the three subscales. In a previous study, the responses of deaf students on the scale were found to be the same as those of hearing students (Mertens & Wang, 1988). Ten-item pre and post multiple choice tests were used to measure the students' understanding of the educational psychology concepts after each of the seven computer based lessons. These tests were similar to those used in the regular assessment in the course, however, students' grades were not affected by their performance on the short tests. A deaf graduate student observed each lesson and took notes concerning any problems encountered, time spent on each lesson, student interactions, and classroom procedures that preceded and followed each lesson. The students also completed a summative opinion questionnaire which included seven items about their reaction to the physical characteristics of the lab and the helpfulness of their teacher and team members.

The students used computer assisted instruction modules for seven different half-hour lessons on the topics of classical conditioning, reinforcement schedules, cognitive learning theory, cognitive development theory, moral development, social learning theory, and individualized instruction. The modules were developed using the Teacher Turned Author software. The basic format consisted of an overview of the lesson, explanation of a theoretical concept (e.g., intermittent reinforcement), and then provision of examples of the concept. The student then answered questions that required both knowledge and application. If a student answered incorrectly, the program branched to an appropriate explanation and then gave the student another chance to answer the question before proceeding with the explanation of the next theoretical concept. The modules were designed to maximize the visual presentation of information (almost all screens, except question frames, contained pictures).

Before the students started work on the computer, they were given a pre-test and were then introduced to the concepts that would be included in the computer lesson. They were given a one-page summary of the main theoretical concepts that were included in each lesson to use as an advance organizer and to help them "keep on track" during the lesson. The computer lab was located down the hall from the classroom and only contained five computers. Therefore, the students had to physically move to the computer lab. In the computer lab, the student worked in teams of 3 or 4 students (because of hardware limitations, more than by design). The students completed the post-tests and rating forms back in the classroom immediately following the computer lesson. The teacher then corrected the tests with the students and provided clarification for any wrong answers. The lesson concluded with additional classroom activities on the topic.

Results

Reaction to the lessons. The majority of the students had positive reactions to the quality of the lessons. For all but 5 of the 63 individual ratings, over 73 percent of the students agreed or strongly agreed that they were satisfied with the quality of the lesson, sufficient time was allowed to complete it, the lesson was interesting and clear, the computer provided helpful feedback, the teacher did a good job teaching the lesson, and their classmates were helpful in getting through the lesson. Observations of the students confirmed that they were helping one another by explaining such terms as random ratio, fixed ratio, or random interval. One student said, "Now I understand". They also patted those who got the correct answers on the back. One group forgot how to start the lesson, and another student helped them, saying, "Just press F3". Students commented on the lesson as they proceeded through it. Exemplary comments included: "What a beautiful drawing of an eagle." "I enjoyed playing with the stuff." "Computer helps." "Fantastic and interesting thing to do."

Despite the overall high ratings, several students expressed a need for more examples and explanation. The computer lab was small for this number of students (a new, larger lab has since been established). Several students complained about the room, the number of computer terminals, and not having a chair to sit on.

Nevertheless, the students' summative ratings of the experience were also uniformly high (see Table 1). Despite the physical limitations, the majority liked the environment in which the project took place, the design of the lab, and the idea of moving from the classroom to the lab. All of the students found the teamwork to be helpful and the majority (84%) found the teacher and classroom instruction to be helpful.

Cognitive outcomes. The results of the analysis of pre and post-tests of cognitive outcomes indicated that significant learning occurred as a result of the computer-based instruction (see Table 2). The means and the results of repeated measures t-tests indicates that the students significantly improved from pre to post testing on all seven modules.

Attitudinal outcomes. A repeated measures MANOVA indicated that the students' attitudes towards computers changed significantly from pre to post testing (see Table 3). The univariate ANOVA's indicated that the change occurred on the Computer Anxiety and Computer Confidence subscales, but not on Computer Liking. The students' attitudes were fairly positive at the beginning of this study, as the highest possible score on the Liking and Confidence scales is 40 and on Anxiety is 36. The students became significantly less anxious and more confident about using computers from pre to post testing.

Discussion

The pretest-post test design precludes making a definitive statement that the use of computer assisted instruction in this educational psychology class was the factor that caused a positive change in the students' attitudes towards computers. Also, because no comparison mode of instruction was used, it cannot be said that the students would not have learned the information if it had been taught in another format. However, the results do support that the students' attitudes did change toward computers in terms of reduced anxiety and greater confidence in using computers. Also, the students did learn significantly more about the educational psychology concepts than they knew at the beginning of each lesson. Given previous research about the impact of the amount of computer experience on computer attitudes, these results provide support that if the nature of the experience is positive, then attitudes can be positively impacted.

Based on research that connects positive attitudes with implementation of instructional innovations (Fahy, 1985), one might hypothesize that such computer-related experiences for deaf preservice teachers could result in greater comfort and confidence in using computers with their own students later. Several researchers have made recommendations regarding the use of computer-assisted instruction with deaf students (Braden & Shaw, 1987; Stuckless, 1983), and ways to interweave computer assisted instruction into regular teacher training programs (Nuccio, 1990) and deaf education programs (Rose & Waldron, 1983). The instructional design used in the present study provides one close look at a program that was associated with positive outcomes.

The instructional design for the computer modules was based on cognitive learning theory which views the learner in an active way such that learning depends jointly on what information is presented and on how the learner processes that information (Farnham-Diggory, 1977). The specific principles of cognitive learning theory that were applied in the present study included (Glover, Ronning & Brunning, 1990) tapping into students' existing schemas by using examples that they were familiar with. For example, assimilation and accommodation were taught using the mental processing needed for a trip to the National Zoo. Repetition, practice and feedback were provided through the use of questions and the branching program throughout each lesson. The practice was made enjoyable as evidenced by the students' positive responses to the activities. Cooperative learning through the use of teams incorporated the benefit of active processing with input from peers. Visual imagery was a strong component of the lessons. Students were required to use higher level thinking skills (comprehension, application) through the nature of the practice questions in the lessons. Advance organizers were given to the students in printed form and again at the beginning of each computer lesson. Multiple examples of each concept were provided in order to provide a rich context for encoding and retrieving the information. Similar testing strategies were used during teaching and for the later assessment.

The present study represents one option for including computer-related experiences for preservice teachers. These students can gain experience with computers by learning about available software that they can use with their own future students (King & Martin, 1990). Such a project is currently underway at Gallaudet University, although no data are yet available about its impact on the preservice teachers' attitudes.

In addition, in-service training for teachers represents another avenue for providing teachers with computer experience. Goldman, Semmel, Cosden, Gerber, and Semmel (1987) surveyed special education administrators in 52 districts about their policies and practices on microcomputer acquisition, allocation, and access for mildly handicapped children. Their results indicated that the majority of the districts had made a commitment to the training of existing staff to implement microcomputer instruction. They concluded that the effective use of technology depended on the availability of knowledgeable personnel and software that was flexible and could be readily adapted to individual needs.

Future research on the use of computers in the training of teachers should focus on the quality of the instructional experience and the impact of the experience on implementation of computer assisted instruction with their future students.

REFERENCES

Braden, J. P. & Shaw, S. R. (1987). Computer assisted instruction with deaf children: panacea, placebo or poison? American Annals of the Deaf, 132(2), 189-193.

Deninger, M. L. (1985). Is it still an apple for the teacher? American Annals of the Deaf, 130, 332-339.

Fahy, P. J. (1985). Instructor attitudes affecting adoption of instructional innovations. Association for Education Data Systems Journal, 19(1), 66-79.

Fann, G. L., Lynch, D. H., & Murranko, P. (1989). Integrating technology: Attitudes as a determinant of the use of microcomputers. Journal of Educational Technology Systems, 17(14), 307-317.

Farnham-Diggory, S. (1977). The cognitive point of view. In D. J. Traffinger, J. K. Davis & R. E. Ripple (Eds.), Handbook of Teaching Educational Psychology. NY: Academic Press.

Glover, J. A., Ronning, R. R., & Bruning, R. H. (1990). Cognitive Psychology for Teachers. NY: Macmillan Publishing Company.

Goldman, S. R., Semmel, D. S., Cosden, M. A., Gerber, M. M. & Semmel, M. I. (1987). Special education administrators' policies and practices on microcomputer acquisition, allocation and access for mildly handicapped children: Interlaces with regular education. Exceptional Children, 53(4), 330-339.

Israelite, N. K. & Hammermeister, F K. (1986). Survey of teacher preparation programs in education of the hearing impaired. American Annals of the Deaf, 131, 232-237.

King, C. M. & Martin, D. S. (1990). Maximizing academic excellence through the use of technology. Washington, DC: Gallaudet University Grant application submitted to IBM Program for Teacher Preparation and Enhancement in the Use of Available Technology.

Lindenau, S. E. (1984). The teacher and technology in the humanities and arts. Modern Language Journal, 68(2), 119-124.

Loyd, B. H. & Gressard, C. (1984a). The effects of sex, age, and computer experience on computer attitudes. Association for Educational Data Systems Journal, 18(2), 67-77.

Loyd, B. H. & Gressard, C. (1984b). Reliability and factorial validity of computer attitude scales. Educational and Psychological Measurements, 44, 501-505.

Mackowiak, K. (1988-89). Deaf college students and computers: The beneficial effect of experience on attitudes. Journal of Educational Technology Systems, 17(3), 219-229.

Martin, C. D. (1988). Ethnographic methods for studying microcomputer implementation in schools. Paper presented at the American Educational Research Association meeting, New Orleans, LA.

McNeil, L. M. (1983). Learning together: Microcomputers in Crosby, Texas Schools. Houston, TX: Rice University.

Meister, G. R. (1984). Successful integration of microcomputers in an elementary school. Stanford, CA: Stanford University, School of Education, Institute for Research on Educational Finance and Governance.

Mertens, D. M. & Wang, Z. (1988). Attitudes toward computers of preservice teachers of hearing-impaired students. American Annals of the Deaf, 133(1), 40-42.

Nuccio, E. J. (1990). Preparing pre-service teachers to use computers. The Technological Horizons in Education Journal, 17(7), 81.

Oates, W. R. (Ed.). (1985). Leadership in literacy for the information age. Urbana, IL: National Council of Teachers of English, Committee on Instructional Technology. (ERIC Document Reproduction Service No. ED 264 566).

Quinsaat, M. G. (1981). Implementing computer technology in a classroom setting: An anecdotal report of long-term use. Paper presented at the NIE Conference on Issues Related to the Implementation of Computer Technology in Schools. Washington, DC: National Institute of Education.

Rose, S. & Waldron, M. (1983). The use of microcomputers in teacher training programs. American Annals of the Deaf, 128, 553-556.

Simpson, A. H. (1984). The effectiveness of computers in vocational education instruction. Flagstaff, AZ: Northern Arizona University, Center for Vocational Education. (ERIC Document Reproduction Service No. ED 254 676).

Stuckless, E. R. (1983). The microcomputer in the instruction of hearing-impaired students: Tool or distraction? American Annals of the Deaf, 128, 515-520.

TABLE 1

Student Response to Evaluation Statements

Question	Agree or Strongly Agree	Disagree or Strongly Disagree	n
1. I like the environment in which the project took place.	89.5%	10.5%	19
2. I like the design of the computer lab itself.	77.8%	22.2%	18
3. I like the idea of moving from the classroom to the computer lab, and from the computer lab to the classroom.	89.5%	10.5%	19
4. The teamwork was helpful to me.	100.0%	-	19
5. The teacher was helpful in the project.	84.2%	15.8%	19
6. Classroom instruction helped me to facil itate the use of computer.	84.2%	15.8%	19
7. Working with the other students helped me understand the lesson better.	88.9%	11.1%	18

TABLE 2

Results of t-tests Conducted for Comparison of Pre- and Post-tests of Cognitive Outcomes

Lessons	Test	X(SD)	df	t	p
Classical Conditioning	Pre-	43.0 (25.5)	15	-2.85	.012
	Post-	66.9 (30.5)			
Schedules of Reinforcement	Pre-	37.1 (23.4)	16	-6.60	<.005
	Post-	77.1 (12.1)			
Ausubel's Cognitive Learning	Pre-	33.6 (18.2)	13	-10.72	<.005
	Post-	95.0 (9.4)			
Moral Development	Pre-	23.9 (31.6)	15	-3.46	.003
	Post-	56.3 (27.2)			
Social Learning Theory	Pre-	56.3 (18.7)	17	-2.25	.038
	Post-	71.1 (22.7)			
Piaget's Theory of Cognitive Development	Pre-	50.0 (19.3)	15	-3.22	.006
	Post-	65.0 (14.6)			
Individualized Instruction	Pre-	29.3 (21.2)	14	-6.32	<.005
	Post-	70.0 (11.3)			

TABLE 3

Multivariate Analysis of Variance of Pre- and Post-Attitude Measures

Analysis of Variance	F	df	sig. of F
Multivariate (Pillai's Trace)	3.60	9,36	.003
Univariate			
Anxiety	9.99	3,12	.001
Confidence	7.92	3,12	.004
Liking	1.93	3,12	.178