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ABSTRACT

How attitudes of parents, teachers, and students toward computers affect the integration and use of computer technology in schools was studied at an elementary school in Texas. Whether these attitudes changed with the introduction of computer technology and the implications of involving parents in the planning of curriculum and activities was also examined. The school purchased Macintosh computers and implemented computer training and laboratory access for teachers, parents, and students. The study involved 475 students, 34 teachers, and 230 parents in two school years. Each group reported successful experiences and positive attitudes toward computers. Measurement indicated that attitudes improved or increased in the second year. High initial enthusiasm makes the impact of the technology less apparent, but results tend to confirm the belief that successful implementation of technology requires a supportive environment from administrators and the community. Three tables present survey findings. (Contains 19 references.) (SLD)

Title:

How do Attitudes of Parents, Teachers, and Students Affect the Integration of Technology into Schools?: A Case Study

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Purpose of the Study

School reform often looks to "technology" to help improve education (Texas Education Agency, 1988; Main & Roberts, 1990; Salehi, Mullinix, Wode, & Dreighton, 1980). Troxel & Grady (1989) suggest that most reform agendas recommend the inclusion of technology within the educational process. For example, the Texas State Board of Education (Texas Education Agency, 1988) developed a long-range plan for the infusion of technology into instruction as a means to increase effectiveness of the curriculum. This Long-Range Plan gave schools with in local districts the charge to select and apply technology to meet local needs. Other school systems (state and local) have reported similar plans (Salehi, et al, 1989; Main & Roberts, 1990).

Burkman (as cited in Martin & Clemente, 1999)) suggested that teachers have strategic roles in what occurs in the classroom. A number of studies have investigated the relationship of attitudes and implementation and use of computers in educational settings (Savenye, Davidson, & Orr, 1991, 1992; Sanders & Stone, 1986; Canning, 1989). In addition, other reported results indicate that implementation and use of computers is also related to student attitudes toward computers (Campbell & Perry, 1989; Raub, 1981). However, in today's schools, teachers and students are no longer the only audiences that are involved in the decisions about implementation and use of computers. For a variety of reasons, parents are also becoming active participants in the planning and implementation of computers into the classroom (Policy Research Project on Education, Technology and the Texas Economy, 1989; Troxel & Grady, 1989). Thus it seems reasonable to postulate that perceptions of parents about technologies would also impact a school's plans for technology infusion. Yet little research investigating attitudes of parents toward computers has been reported in the literature.

The purpose of the study was to address the research questions: (1) How do the attitudes of teachers, students and parents towards computers affect the integration and use of computer technology in schools?; (2) Do these attitudes change (either positively or negatively) or remain constant after the implementation of technology into classroom?; and (3) What are the implications of involving parents in the planning of school curriculum and activities?

Background Information

Highland Park Elementary School, located in Austin, Texas, has slightly under 500 students and has a relatively new building in comparison to other schools in the district. The vast majority of the population is white (an estimated 5-10% were minority) and economically falls into a high middle to upper income area of the city. Class sizes are around 21 to 25 and there is low teacher turnover. Administrative support of teachers is high and, based on informal observation and conversation, mutual respect and cooperation among teachers and administrators is high. According to the Highland Park School report, the school has 29 local business and community organizations as Corporate partners (Adopt-A-School) and a minimum of 40 volunteers in the Community/Parent Volunteers organization.

As a means to continue their tradition of innovation, the school purchased 10 Macintosh computers through funds raised by collaborative efforts of the school, parents and local business adopters. The school joined in a partnering consortium with Apple Computer, Inc. to facilitate the purchase of additional computers (up to 25 Macintoshes) and collaborate on the applications of computers in classrooms. The school established a computer committee to develop plans for the integration and use of computers in the

curriculum and other school activities. The computer committee was made up of teacher representatives from all grade levels and departments in the school, plus parents, and community leaders. The committee developed plans for computer training and lab access for teachers parents, and students.

The committee invited the principal investigator to the project meetings to assist them in the project. One outcome of these planning meetings was to develop a means to document and describe the experience level, attitudes towards computers, and computer use of parents, teachers, and students as the computer integration was occurring. It was determined that 1991 would serve as the baseline year for gathering data on experience, attitudes, and patterns of use. Then in subsequent years, similar data could be gathered and compared to the 1991 information, noting any significant changes in these areas. To identify these attitudes and perceptions, a survey study was formulated and conducted during the spring semester of 1991 and 1992.

Method

Study Site. The study was conducted using parents, teachers and students of Highland Park Elementary School in Austin, Texas (a medium size urban school district in Texas). The school site and the participants for this study were not selected at random. The study was conducted at the request of the school's computer committee and was based, in part, upon the willingness of the school personnel, students, and parents to participate in the study. The study involved approximately 475 students enrolled in kindergarten through fifth grades, 34 teachers, and 230 parents during both data collection periods.

Procedure. In January and February, 1991, a subgroup of the school's computer committee met with the principal researcher to develop the questionnaires for the three populations--students, teachers, and parents. In March, 1991, the final draft of the surveys were completed and reproduced for distribution. In late April, 1991, the instruments were distributed to all three groups. Teachers at each grade level were responsible for administering the survey to the students as well as completing their own survey individually. With the exception of kindergarten, first grade and special education classes, students read and responded to each item independently. Teachers in the kindergarten, first grade, and special education classes read the items and asked each individual student to respond as the teacher marked the response sheet accordingly. The parent questionnaires were sent home with the children. Care was taken to see that only one survey was sent to each home. Attached directions asked that only one parent respond to the questionnaire and return it . The surveys from all three groups were returned within two weeks, and then coded for analysis. One year later, the questionnaires, with some modifications were administered to the teachers, students and parents in a similar manner.

Instruments. The questionnaire instruments were developed for each subpopulation of the school (Davidson & Ritchie, 1992). The questionnaires were based, in part, on items from a preassessment questionnaire by Smith, Savenye and Davidson (1988) and an attitude instrument by Savenye, Davidson, and Orr (1991, 1992). These instruments consisted of demographic items, followed by items on computer experience and attitudes and anxiety about computers. The teacher and parent surveys also included items on perceptions about the impact of computers on teachers' roles and students' self esteem and issues about computer training and workshops specific to that particular school. Subjects responded to attitude anxiety items using a five-point Likert-type scale of strongly agree to strongly disagree. The student survey contained a total of 21 items; the teacher survey contained 45 items and the parent survey contained 43 items. In an effort to encourage frank responses to items, all respondents could remain anonymous. (Note: Not all of the items are discussed in this paper; for a full discussion, see technical report by Davidson and Ritchie (1992)). All subjects used a response sheet to record their answers.

Design and Data Analysis

Due to the conditions of anonymity, the surveys completed by the same individuals in 1991 and 1992 could not be correlated for statistical analysis. Therefore, the three sets of samples (teachers, parents, and students) were considered independent for all analyses of variance. Differences in the mean responses for each item related to computer attitudes and anxieties between the 1991 and 1992 survey groups were assessed with multiple t-tests. The results yielded statistically significant differences for some items within each of the three participant groups.

Reliability coefficients, calculated for each group based on the combined responses to the survey items from 1991 and 1992, revealed a few items of low reliability. As a result, item 37 from the teacher survey, items 35 and 37 from the parent survey, and item 9 from the student survey, were excluded from the factor analysis. The final reliability coefficients (Cronbach's alpha) were .79 for the student and parent surveys, and .87 for the teacher survey.

Questions 1- How do attitudes toward computers affect the integration and use of computers technology in schools?
Question 2 - Do these attitudes change or remain constant after the implementation of technology into classroom?

Student Group. The entire student body of Highland Park Elementary was almost equally divided between genders for both years 1991 and 1992. Based on the demographics collected in the survey, kindergartners and first graders comprised the greatest portion of the student population (37%) in 1991 and (48%) in 1992, with a relatively even split in the remaining grades. Almost all students had used a computer before the survey was taken in the spring, 1991. A little more than half of the student body had a computer at home (58%) in 1991 and this percentage increased to 68% by the end of 1992.

The strongest attitudes about computers among students were positively expressed in two items: Students (95% in 1991 and 99% in 1992) definitely believed that they could learn how to use a computer, and they (96% in 1991 and 98% in 1992) also expressed that they would like to use a computer at home. These responses (items 10 and 15, respectively) are shown in Table 1. Students (91% in 1991 and 95% in 1992) also indicated that they liked to learn using a computer (item 19) and they (92% in 1991 and 1992) were excited about new things in the computer lab (item 18). Students as a whole (93% in 1991 and 97% in 1992) generally agreed that computer lessons are fun (item 11). Most students responded that they liked to experiment on the computers.

The 1991 data indicated that most students were comfortable with computer interaction, but there were still some exceptions. For example, kindergarten-first graders (35%) responded that they were afraid to touch a computer in 1991. (However, only three percent of the 1992 respondents were afraid to touch a computer.) Kindergarten-first and fifth graders (30%) feared that they might break or damage a computer. Some Kindergarten-first graders (32%) also stated that they got nervous when people talked about computers. About a third of the student body did not like to read about computers. Interestingly, first graders expressed the most positive attitudes towards reading about computers in 1991. Students as a whole (87%) think that computer lessons are interesting and 84% of them would like to have more computer lessons each week. However, 21% of the kindergarten-first graders were not as interested in computer lessons in 1991. Similarly, 20% of the fourth graders did not want more computer lessons each week in 1991, and this percentage remained relatively stable (23%) in 1992 (item 14).

Most students (85% in 1991 and 1992) thought learning is more exciting with computers (see item 20). Although 21% of the second graders in 1991 did not necessarily agree with this response. Combining the responses of strongly agree and agree, a majority of students (72% in 1991 and 67% in 1992) stated that they learn "better" using a computer

(item 21). The strongest disagreement came from 40% of the fifth grade students and 35% of the second grade students in 1991. In both years, more than half of the students responded that they would like to have a job working with computers someday (item 17). Complete descriptive statistics are available from the authors upon request (Davidson & Ritchie, 1992).

Table 1 presents the results of independent t-tests on each item for the entire school population as a whole. Items 5, 6, and 7 were intended to assess anxieties related to computers. For each of these items, the means indicate that the student population disagreed more strongly in 1992 than in 1991. Stronger disagreement with these items indicates less anxiety about computer use. Items 10, 13, and 15 were intended to assess general attitudes towards computers. The means of these items show that the student population was in even stronger agreement in 1992 than in 1991.

Table 1
Independent T-Tests for Student Group (K-5): 1991 vs. 1992

Item	1991 mean	1992 mean	*f*	*p*
5. I feel afraid to touch a computer.	3.48	3.75	2.37	*<.001
6. I feel afraid that I might break or damage a computer.	3.15	3.40	1.31	* .003
7. I feel nervous when people talk about computers.	3.45	3.71	1.90	*<.001
8. I enjoy reading about computers.**	2.20	2.16	1.06	.516
9. I feel that people who know something about computers know more than I do.	2.75	2.73	1.01	.873
10. I can learn how to use a computer.**	1.38	1.21	1.80	*<.001
11. Computer lessons are fun.**	1.64	1.56	1.05	.601
12. I would like to belong to a computer club.**	2.27	2.17	1.02	.867
13. I like to experiment on the computer.**	1.60	1.44	1.25	* .014
14. Schools should have more computer lessons each week.**	1.72	1.69	1.09	.371
15. I would like to use a computer at home.**	1.41	1.29	1.26	* .011
16. Computers are not interesting to me.	3.59	3.65	1.04	.640
17. Someday, I would like to have a job working with computers.**	2.25	2.21	1.17	.093
18. I get excited about new things in our computer lab.**	1.62	1.59	1.04	.676
19. I like to learn with a computer.**	1.65	1.55	1.04	.681
20. It is more exciting to learn with a computer.**	1.69	1.64	1.01	.925
21. I learn "better" using a computer.**	2.01	2.06	1.04	.657

*p<.05 scale: 1 strongly agree 2 agree 3 neutral 4 disagree 5 strongly disagree

Teacher Group. The faculty of Highland Park Elementary School was predominantly female (88%) with a relatively even mix of age groups. The demographic results showed that only one faculty member indicated being a beginning teacher with 64% of the faculty having had six or more years of teaching experience. Over half (52%) of the teachers reported that they had computers at home with 60% being Macintoshes. Of the remaining faculty who did not currently have a computer at home, half of them planned to purchase one within the next two years with 77% of them planning to purchase Macintoshes. All of the faculty member had used computers previously (with 97% in 1991

having used a microcomputer). The Apple II series of computers and the Macintosh were the computers most frequently used by the faculty, with a small percentage (6%) of faculty having used IBM, or IBM compatibles in 1991. Their responses to these items were similar in 1992. In 1991, 88% of the faculty indicated having taken a computer course or workshop (88%); this had increased to 97% in 1992. Even though teachers were experienced with computes, most teachers (91% in 1991) rated their experience with computers as only good or fair and 9% rated it as poor. In 1992, no faculty rated their experience as poor and 6% felt very experienced.

Faculty attitudes towards the use of computers in education were generally very positive in both 1991 and remained consistently high in 1992. Most faculty members (85% in 1991 and 94% in 1992) valued teaching with technology (item 21). The majority of the faculty strongly agreed or agreed that the use of technology will enhance teaching (item 22-97%), motivation of students (item 32- 97%), and improve student performance (item 34-88%) in 1991 and their responses were similar in 1992. The faculty were unanimous in believing that computer use is of value to students (combining responses of valuable, very valuable, and extremely valuable) in both 1991 and 1992. Computers were seen as a tool to further individualize instruction (item 58). One-third of the faculty believed that the use of computers will actually decrease their planning time and by 1992, 42% of them believed that computers would decrease their planning time. This faculty appeared confident that computers would not take over their jobs or diminish their roles as teachers. Nearly all teachers (97%) expressed confidence in their ability to learn how to use a computer.

A few aspects of computers were of concern to the faculty in 1991. A small percentage of the faculty (9%) were actually afraid to touch a computer (item 24). Some faculty (15%) expressed concerns that they might break or damage a computer (item 25). About one-third of the teachers acknowledged that they were uncomfortable with people who are knowledgeable of computers (item 28-30) and 12% were tense when people talked about computers (item 26). These concerns diminished somewhat in 1992, but not entirely. The area of greatest concern was the impact of computers on the role of the teacher. A majority (59%) of the faculty believed their role as teacher would be more complex when using computers (item 37). A large percentage of teachers (41%) expressed some concern that teachers may actually have to compete with computer instruction in the classroom. One-fourth of the teachers believed that use of the computer would increase their planning time. Teachers who expressed these concerns may believe that an increased complexity to teaching is inevitable, since the faculty was unanimous in believing that instruction by computer technology is here to stay. Responses for these items in 1992 were similar.

Table 2 below summarizes the independent t-tests for items 21 through 37 on the teacher survey. Even though teachers began the study showing positive attitudes, Table 2 shows that there were significant positive changes in items, 24, 32, 33, and 36, which relate to attitudes and anxieties toward computers.

Table 2
Independent T-tests for Teacher Group: 1991 vs. 1992

Item	1991 mean	1992 mean	*f*	*p*
21. I like to teach with computer technology.	1.65	1.73	1.63	.168
22. I think quality instruction using technology will only enhance my teaching.	1.44	1.61	1.02	.96
23. I value teaching with technology.	1.44	1.45	1.23	.559
24. I feel afraid to touch a computer.	4.50	4.64	2.21	*.027
25. I feel afraid that I might break or damage a computer.	4.03	4.30	1.44	.309
26. I feel tense when people talk about computers.	3.91	4.06	1.14	.715
27. I enjoy reading about computers.	3.03	2.82	1.10	.795
28. I feel intimidated by people who know something about computers.	3.47	3.91	1.61	.179
29. I think computers are dehumanizing.	4.32	4.39	1.26	.514
30. I fear that computers may take over some parts of a job that I enjoy.	4.26	4.30	1.49	.257
31. I feel confident that I can learn how to use a computer.	1.38	1.42	1.65	.157
32. I think students are more motivated when they can learn using computer technology.	1.56	1.76	2.39	*.015
33. I think instruction by computer technology is just another fad.	4.68	4.48	2.25	*.023
34. I think that using instruction via computer technology will help improve students' performance.	1.74	1.82	1.26	.512
35. I think teachers compete with slick packages and high tech machines.	3.85	3.76	1.42	.325
36. When utilizing computers, the teacher becomes guide/facilitator.	1.97	1.58	2.41	*.015
37. When utilizing computers, the teacher's role becomes more complex.	2.50	2.33	1.34	.410
38. When utilizing computers, the teacher is able to further individualize instruction.	1.94	1.85	1.05	.896
39. When utilizing computers, the teacher's role is diminished.	4.44	4.48	1.02	.960

*p<.05 scale: 1 strongly agree 2 agree 3 neutral 4 disagree 5 strongly disagree

Parent Group...Parents responding to the questionnaire were predominantly female (69% in 1991 and 73% in 1992) and between the ages of 30 and 49 (94%). The majority of respondents (85%) had earned a bachelor's degree or higher with 15% having earned a Ph.D. Approximately 61% had computers at home in 1991, and this increased to 67% in 1992. Almost all respondents (94%) had used microcomputers, with 46% being IBM personal computers in 1991, a figure which increased to 58% in 1992. Macintosh, the predominant platform at school, was second in use and the Apple II series computer as being the least frequently used. Nearly half of the parents (46%) considered themselves "good" or "very experienced" with computer technologies in 1991, and this figure increased

slightly in 1992. Parents' attitudes toward computers were generally very positive. For instance, when asked to respond to the item "I feel afraid to touch a computer," 87% of the parents disagreed or strongly disagreed with the statement. With the statement " I feel confident that I can learn how to use a computer", 94% were in agreement. There remained a small number of respondents (7-8%) who expressed uncertainties or fears associated with computers. (See items 24, 25, 26 & 28.) The 1992 results indicated little change in these percentages.

The majority of parent respondents (74%) indicated that they thought that the teacher would become more of a guide/facilitator and they also agreed that a teacher would be able to further individualize instruction using the computer. The role of the teacher when using computers was viewed as more complex (47%) and not diminished by using computers (81%) by a majority of these respondents. And they also disagreed (24% strongly disagree and 40% disagree) with the statement that "teachers compete with slick software packages and high tech machines." Again, the 1992 results indicated little change in these attitudes.

Parental responses also reflected a general belief that students are more motivated and would have improved performance with computers. Of the total, 79% of the respondents either agreed or strongly agreed with the statement that students are more motivated when they can learn using computer technology (item 32). With item 34 which was related to improved students' performance using instruction via computer technology, 70% were in agreement. The parents placed strong value on learning to use computers as a part of their children's education (with 97% either indicating valuable, very valuable, or extremely valuable).

Tables 3 summarizes the results on independent t-tests on items 24 through 39. Only three items (items 30, 32, and 36) were found to be statistically significant. Interestingly, item 32, 'attitudes *towards instruction with computers'*, helps explain over 16% of the variance between the parent responses in 1991 and 1992.

Table 3
Independent T-tests for Parent Group: 1991 vs. 1992

Item	1991 mean	1992 mean	*f*	*p*
24. I feel afraid to touch a computer.	4.43	4.47	1.08	.579
25. I feel afraid that I might break or damage a computer.	4.38	4.48	1.04	.765
26. I feel tense when people talk about computers.	4.17	4.26	1.01	.932
27. I enjoy reading about computers.	2.99	3.08	1.18	.212
28. I feel intimidated by people who know something about computers.	4.07	4.05	1.11	.445
29. I think computers are dehumanizing.	4.30	4.29	1.13	.337
30. I fear that computers may take over some parts of a job that I enjoy.	4.26	4.44	1.51	*.002
31. I feel confident that I can learn how to use a computer.	1.50	1.47	1.23	.109
32. I think students are more motivated when they can learn using computer technology.	1.89	1.72	1.34	*.026
33. I think instruction by computer technology is just another fad.	4.34	4.40	1.12	.402
34. I think that using instruction via computer technology will help improve students' performance.	2.14	1.99	1.20	.172
35. I think teachers compete with slick packages and high tech machines.	3.76	3.81	1.02	.880
36. When utilizing computers, the teacher becomes guide/facilitator.	2.24	2.10	1.37	*.018
37. When utilizing computers, the teacher's role becomes more complex.	2.68	2.71	1.20	.170
38. When utilizing computers, the teacher is able to further individualize instruction.	2.20	2.10	1.04	.745
39. When utilizing computers, the teacher's role is diminished.	4.06	4.16	1.27	.066

*p<.05 scale: 1 strongly agree 2 agree 3 neutral 4 disagree 5 strongly disagree

Question 3: What are the implications of involving parents in the planning of school curriculum and activities?

Teacher Group. Not surprisingly, the computer experience of teachers increased substantially over the one-year period. The faculty were unanimous in believing that the computer was of value to students and there were no significant differences among the 1991 and 1992 comparisons. Most faculty valued teaching with computers, and, by 1992, 42% of them believed that computers would decrease their planning time. Interestingly, software ratings decreased dramatically by the faculty, which is similar to the findings reported by Savenye, Davidson, and Orr (1992). However, teachers' attitudes toward computers were in general very positive in 1991 and remained positive at the end of the study. Conversely, teachers' anxieties toward using computers were relatively minor and remained unchanged at the culmination of the study. The lack of change may be due, in part, to a ceiling effect. Teacher attitudes were very high and anxieties were very low in 1991. Except for a few individual items, no significant changes occurred in 1992. The changes that were noted indicated even more positive attitudes and lower anxieties.

Student Group. The majority of the students reported some computer experience with more than half reported having a computer at home. Attitudes about computers among the total student population of the school were generally positive. For the most part, students showed low anxiety toward computers in 1991. Even so, students showed a significant decrease in their anxiety toward computers at the culmination of the study in 1992. Accompanying this change was a significant increase in students' general attitudes towards computers. As students' computer anxiety lessened, their interest in using and learning with computer apparently increased.

Parent Group. Two thirds of the parents had comp ..ers in the home and most consider themselves experienced with computers. Attitudes towards computers were generally very positive and changed little between 1991 and 1992. A majority of the parents believed that the emphasis on computer use at the school was at the appropriate level and also believed that computes have a positive impact on children's self esteem.

Summary of Results

Each of the three groups reported successful experiences with the computer and that their attitudes were positive about computers in both 1991 and 1992. Whether it was because attitudes were high that the changes in experience increased with each group or because the groups tended to be experienced with computers that attitudes remained positive or increased remains the question. With this study, we seemed to have run into a chicken-and-egg type of dilemma, that is, which came first (attitudes or successful experience) and had influence over the other. We speculate that it may have been a little bit of both. Soliciting and sustaining the involvement of students, teachers, and parents in the implementation of computer technologies may have resulted in a synergistic effect which augmented the already positive attitudes of the Highland Park Elementary School community towards technology. Therefore, one strong implication of this study may be that serious consideration of the notion of school community involvement must be given when planning for the integration of computers (or any innovation) in schools.

When a total school community is being surveyed about attitudes and perceptions toward computers, the complexity of variables is increased and thus leads to a richness in information about integrating computers into a school environment. By considering parental attitudes in addition to teacher and student, perhaps a better understanding of community support will be established. This understanding could help build widespread support for implementation and infusion of computer technologies within the school.

However, the success at Highland Park Elementary indicated by this study is also due, in part, to measures taken by school leaders during the planning and implementation of computer technology. Teachers were allowed, and encouraged, to take school computers home for self-paced training during the summer of 1991. Over 60% of the teachers availed themselves to this opportunity. Strong collegial relationships helped support general on-going in-house training; teachers continually trained other teachers informally. Faculty were offered over 20 inservice computer training opportunities conducted by teacher leaders, corporate, and university personnel. In addition, parents were offered the opportunity to participate in school-sponsored computer training sessions. Parents were very involved in raising moneys for the computer and actively volunteered for after school computer clubs with students. Thus, results tend to confirm the belief that integration of technology requires a supportive environment from administrators, fellow colleagues, and the community.

While the results of the study are extremely encouraging, one must be cautious about drawing generalizations and inferences about the reported findings to other school populations or environments. This caution is due in part to the nature of the design of the study and the nonrandomization of the participant selection. For the most part, the three groups surveyed may not be typical or representative of the population at large. For

instance, the faculty were very experienced in teaching, a large percent of the children (at all grade levels) had experience with computers with half having a computer in the home, and a significant number of the parents had college degrees or higher.

The outcomes of the survey show promise that computers can be effectively implemented into the classroom with student, teacher, and parent attitudes remaining positive and their experiences, successful. It is recommended that additional longitudinal studies be designed and conducted to further substantiate these findings.

References

Canning, C. (1989, March). Adoption of computing: The experience of six successful teachers. Paper presented at the annual meeting of the American Educational Research Association. San Francisco, CA.

Collis, B. (1988). *Computers, Curriculum and Whole-Class Instruction.* Belmont, CA: Wadsworth Publishing Company, Inc.

Davidson, G.V. & Ritchie, S. (1992). *Parent, Teacher, And Student Attitudes Toward Computers at Highland Park Elementary School: Survey Results for 1991 and 1992.* Austin, TX: Technical Report to Highland Park Elementary School.

Davidson, G.V. & Ritchie, S. (1992). *Computer Use and Attitudes Survey.* (Separate versions for students, teachers, and parents). Unpublished. Austin, TX: The University of Texas.

Highland Park Elementary School (1990). *A Strategic Plan for Computer Technology for Highland Park elementary School..* Austin, TX: same as author.

Hudiburg, R.A. (1989). Psychology of computer use: XVII. Measuring technostress: computer-related stress. *Psychological Reports,* 64, 767-772.

Main, R.G. & Roberts, L. (1990, December). Educational technology in the California public schools: A Statewide survey. *Educational Technology,* 30, 7-19.

Martin, B. & Clemente, (1990). Instructional systems design and public schools. *Educational Technology Research & Development,* 38 (2), 61-75.

Mertens, D.M. & Wang, Z. (1988). Attitudes Towards Computers of Preservice Teachers of Hearing-Impaired Students. *American Annals of the Deaf,* 133 (1), 40-42.

Raub, A. C. (1981). Correlates of Computer Anxiety in College Students. Unpublished doctoral dissertation. University of Pennsylvania.

Salehi, S., Mullinix, P., Wode, J., & Dreighton, N. (1988, March). *Maryland's Statewide Educational Technology Network Description & Evaluation.* Baltimore, MD: Maryland State Department of Education.

Sanders, J.S. & Stone, A. (1986). *The Neuter Computers: Computer for girls and boys.* NY: Neal-Schuman Publishers, Inc.

Savenye, W.C., Davidson, G.V., & Orr, K.B. (1991, April). Preservice teachers' attitudes and anxiety toward computers in a Computer Literacy Course. Paper presented at the annual meeting of the American Educational Research Association, Chicago, IL.

Savenye, W.C., Davidson, G.V. & Orr, K.B. (1992). Effects of educational computing course on preservice teachers' attitudes and anxiety toward computers. *Journal of Computing in Childhood Education,* 3 (1), 31-41.

Savenye, W.C., Haas, N., & Pollock, M. (1986.) Effects of a school district microcomputer infusion on teacher attitudes toward computers. Paper presented at the annual conference for the Association of Educational Communications and Technology, Las Vegas, NV.

Smith, P.L., Savenye, W.C., & Davidson, G.V. (1988). *Computer Experience, Attitudes, and Anxiety Assessment Instrument.* Unpublished. Austin, TX: The University of Texas.

Texas Education Agency. (1988). *1988-2000 Long-Range Plan for Technology of the Texas State Board of Education.* Austin, TX: Texas Education Agency.

Troxel, D.K. & Grady, W. F. (1989). The state of educational technology in the United States of America. *International Journal Instructional Media*, 16 (1), 1-13.

Woodrow, J.E.. (1989). Teachers' knowledge of educational applications of computers. *Journal of Computers in Mathematics and Science Teaching.* 8, (4), 31-38.