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ABSTRACT

This study explored elementary school teachers' personal experiences with using computers in the classroom, their present use of computers in the classroom, and their views on current computer use as compared to their preferred use in classroom instruction. A total of 149 teachers from 15 elementary schools randomly chosen from two counties in western New York participated in the study. Teachers answered a survey questionnaire on their training in, and knowledge of, computers; their comfort level in using computers for teaching; and their computer use in classroom instruction. The teachers also discussed the amount of training they would prefer to receive, their preferred comfort level in using computers in the classroom, and their preferred level of integrating computers into their teaching. Based on teachers' responses, significant differences and positive correlations were found between teachers' present computer training, level of comfort, and computer usage in the classroom as compared to their preferred training, comfort level, and usage. The questionnaire is appended. (Contains 26 references.) (SM)

A comparative analysis of present and preferred situations of elementary grade teachers in using computers for classroom instruction

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A comparative analysis of present and preferred situations of elementary grade teachers in using computers for classroom instruction

This study explored elementary grade teachers' personal experience with instructional computing and the role of computers they would like to see as a benefit to students in their learning process. One hundred forty nine teachers, from 15 elementary schools randomly chosen from two counties in Western New York, participated in the study. Teachers answered a survey questionnaire on their training and knowledge in computers, their comfort level in using computers for teaching, and computer usage in classroom instruction. The teachers also answered to what extent do they prefer to receive more training, be more comfortable using computers and integrate computers more in their teaching. Based on teachers' responses, significant differences and positive correlation were found between teachers' present computer training, level of comfort, and computer usage in the classrooms as compared to their preferred training, comfort, and usage.

INTRODUCTION

Since the Industrial Revolution, few developments match or exceed the computer in its revolutionary impact on the world. Its influence has been tremendous. From the child's playroom to shuttle flights to the outer space, the computer is omnipresent; but the challenge to the educators is to learn how to effectively use it in the classrooms. At all levels of education there is continued increase in use of the computer. Computing proficiencies are increasingly being expected of the members of the teaching profession. However, previous research indicates teachers felt inadequate and frustrated by their limited knowledge and efficiency in computer usage in the classroom (Bychowski and Van Dusseldorp, 1984). As Preskill (1988) stated the kinds of feelings that teachers' have towards computers range anywhere from hostility, to fear, to euphoria. This argues the need for teachers' preparation for learning computer skills and furthermore advocates that it is necessary for teachers to use computers in classroom instruction. Since teachers

interact with the students on a regular basis, they are the ones who should be comfortable in the newer instructional practices by using computers as one of their teaching tools; they need to be comfortable in their own computer knowledge and skills before they administer new instructional techniques and have students use it. Teachers need to experience various computing processes that enable them to offer more to children. Not only the teachers need to become more comfortable with the associated attitudes but also with the accompanying techniques. After all, the ultimate aim is to help students develop computer skills for further application so that they are aware of the technology and that they need to be adaptive to changes along with the developmental process. If computers can assist teachers in the overall teaching process and benefit the students then there is a good reason to welcome their appearance (Adams, 1985).

Considering the wide range of computer application in today's world, and society's usage of computers in all spheres of life, teachers and school administrators cannot ignore the need for school children to be exposed to computer based instruction, thereby indicating the urgency for them to have computer training so as to meet the societal demand. If the instruction begins at the elementary level then the teachers will feel comfortable in adopting the training process which perhaps will be comparatively suitable for them. This can occur in a phased manner so that proper understanding of classroom training is obtained, which is beneficial for students, teachers, and school towards fulfillment of the objective.

Certain competencies in using computers are required by teachers. Research conducted by Niederhauser, and Stoddart (1994), examined teachers' beliefs about computer assisted instruction relating to the instructional software they use, types of

computer related activities they provide to their students, if they received training in using computers, and whether they integrate computers in their teaching. Results indicated that some teachers believe that computers are tools that students use to collect, analyze, and present information, while others believe that teachers can integrate the use of computers in their instruction process; and that elementary teachers favored a more transmission oriented view on the effective use of computers. Lacina (1984) pointed out that although computer aided instruction is very much needed, teachers cannot teach using computers if they are not comfortable with computers. "Computers are now available more than before, and training is also provided to the teachers, yet teachers do not know how to integrate computers in classroom instruction. In a few schools, primarily in elementary schools, no teachers regularly use the school-owned microcomputer with their students. Most often, though, one or two teachers are involved in its use yet the evidence from our national survey of microcomputer using schools is that secondary schools remain the largest pre-college users of microcomputers" (Becker, 1983). Ely (1993), described computer usage in schools and universities and further hypothesized about non-use, limited-use, and inappropriate use. He noted: "most teachers who become involved in computer-based instruction are never the same again. But, in the United States, that number is relatively small when compared with the entire population of elementary and secondary teachers...." Since teaching practice is based upon successful experience in the classroom, through appropriate utilization of technology in form of computers, professional development needs to focus on how a change in newer teaching methods can be supported and be encouraged. For a teacher to implement new

form of instructional method through computers, thorough training in computers is needed so as to impart the same value of teaching through the new media.

Spotts and Bowman (1995), noted that "the impact of computers on elementary and secondary education continues to grow rapidly," yet "only a small minority of teachers [and students] could be said to be major computer users...." (Becker et. al., 1990) Novak's (1991) research explored "beginning elementary teachers' ... in their new role as a teacher, do not emphasize on computer usage simply because they view computers as "extra" and "special" and not as a tool to enhance teaching or instructional methods. Citing Sheingold and Hadley (1990), the five highest barriers to the use of computers with teachers already using computers are: lack of time, scheduling computer time, too few computers, not enough time in school schedule for computer-based instruction, and inadequate financial support for computers (Ely, 1993). Further, several reasons that prevent implementation for those who were not currently using computers in the classroom were dissatisfaction with the status quo, insufficient knowledge and skill, lack of resources, available time, commitment from supervisors, lack of inspiration from leadership contingents, lack of rewards or incentives, and participation expected, not shared (Ely, 1993). These lists suggest reasons why there is not more widespread usage of computers in the classroom. Winnans and Brown (1991) indicated self-efficacy and confidence are major issues that affect elementary teachers use of computers. Other factors included, lack of computer resource person in the school for them to seek assistance if situation arises, limited use of computer related sources and materials provided by the district, and the limited number of computers that were available to them.

Some teachers don't believe that the computer improves learning outcomes (Wiske, et al, 1990). Some teachers resent the computer because they see it as a competitor for the student's attention (McMahon, 1990), lack of administrative support and increase investment of time (Cuban, 1989), fearsome non-users scared of losing control of "center stage" and others feared "looking stupid" in front of the students (Wiske et al. 1990). teaching.

As suggested by Adams (1985) "implementing computers in the classroom requires more than mechanical change by the teacher. There is the extremely important element of personal change. A teacher putting the new tool to work in the classroom may experience a change that goes well beyond materials or techniques. There is the potential for change in the whole spirit of the classroom with the teacher acting as a resource person, assisting learning in a more informal, independent, and non coercive environment." Investigation by Evans (1995) indicated that teachers exert their autonomy and discretion when they respond to technical change in the elementary schools.

According to Hannifin and Savenye (1993) poorly designed software applications and lack of time to design their own software often cause teachers to give up using computers at the early stages of adoption into the classroom. In the research study relating to computer usage by the elementary teachers in a rural school, Frase (1996) indicated that teachers were forced to use pre-installed software that were available through the network. These programs, however, were chosen by school district authorities and teachers had no choice in selecting computer programs that they felt would meet individual needs of their students. Research by Frase (1996) also revealed the state of frustration among elementary teachers in not being able to voice their needs

to use computers. The perspective of teachers is of equal importance and should be considered in preparation for classroom teaching. Teacher preparation should emphasize how computers can improve the performance of students through the appropriate teaching methods and support of teachers' commitment to the curriculum and their relative expectations. Analyzing the above case, it may be appropriate to presume that since teachers interact with students on a regular basis, teachers' views on software selection should be considered. There is a need to understand the state of the art regarding computer aided instruction and of teachers' computer usage in the classroom.

Studies indicated the need for computer training for teachers, and cited the importance of computers in classroom teaching. Few studies have been done to investigate elementary teachers' perception of computer usage in classroom instruction. It also seems plausible to investigate whether or not computer training provided to the teachers is appropriate, relevant and adequate from the teachers' perception. The attitude that teachers have towards using computers for classroom instruction to elementary grade students and their feelings about being held accountable for teaching computers need to be analyzed to further understand what needs to be done to better prepare teachers to use computers in the classroom. The purpose of the study is to explore the factors relating to elementary grade teachers' perceptions of computer training and usage in their present situation, their personal experience with instructional computing, and their views on current use of computers as compared to their preferred roles for computers in classroom instruction.

METHOD

Sample

Fifteen elementary schools were randomly chosen from Erie and Niagara Counties in Western New York. These two counties are the most populous of the eight Western New York counties. From the selected schools, teachers willing to participate were the subjects of the study. A total of 200 survey questionnaires were distributed to these teachers. One hundred and forty-nine teachers responded. This represents a return rate of 74.5%.

Of the 149 teachers who responded, 124 were female and 25 were male. Thirty two teachers had a Bachelors degree and 117 teachers had a Master's degree. A majority of the teachers (91 or 61%) reported teaching at grade levels PreK-3, 55 teachers (37%) were teaching at grade 4-6, and three specialty teachers (2%) stated teaching at all grades PreK-6. With regard to their teaching experience, 86 teachers (58%) had more than ten years of teaching experience, 33 teachers (22%) had between 6-10 years and 30 teachers (20%) had less than 5 years of teaching experience.

Instrument

A five page, 46 item close-ended questionnaire was developed and also modified from previous assessment instruments in the area of instructional computing (Lloyd-Kolkin & Tyner, 1988; Mergendoller et al., 1992; Peters et al., 1995; Price & Brunson, 1986; Smith, 1995). The format of the questionnaire was adopted from an instrument developed by Milbrath & Doyno (1987). Kahn et al. (1957) indicated that close-ended questions were appropriate when the objective was limited to the classification of the

respondent with respect to some attitude or perception. The survey questionnaire of this research consisted of five sections - Demographic information, and Sections A, B and C. The first section of the questionnaire contained the demographic information of the respondent. It began with respondent's gender, followed by his or her educational background, the years of teaching experience, the teaching grade level, class size, type of computers in respondent's school for students' use , number of computers available, students' accessibility to computers, and the level of encouragement that respondents received from their respective supervisors.

Section A consisted of seven questions, and measured teachers' perceptions of their computer training and knowledge. Responses to the questions in this section reflected teachers' opinions on the training opportunities they received, whether they took advantage of those opportunities offered within or outside the school districts, teachers' views on their schools' technological resources, and technical assistance available, teachers' perception about their computer knowledge.

There were nine questions in Section B which probed into teachers' level of comfort in using the computer. Specifically, the questions elicited teachers' responses relating to their comfort level in using computers in the classrooms, their beliefs in enhancing teaching abilities through computers, and teachers' level of interaction with the students relating to computers. Also, the questions aided in teachers' self assessment on the effect of computer aided instruction in their teaching methods, by integrating computers in curriculum and in motivating the students.

Lastly, the eleven questions in Section C explored teachers' computer usage. Responses to each of the question items reflected teachers' views on their using

computers as a tutorial aid or in updating students records. The questions sought to determine if teachers used computers to help students develop concepts, in problem solving, for drill and practice and for instructional games. Other questions further probed into teachers' computer usage as a general tool for e-mail purposes or to retrieve information through Internet. The section concluded with questions relating to the extent of teachers' using computers to help students create and use presentation graphics and the extent to which they planned curriculum instruction with integration of technology in their mind.

Questions in the last three sections were formatted in a way that allowed teachers to respond to the present and preferred situations. These "Present" and "Preferred" responses were structured in a five point Likert-type scale ranging from **Strongly Agree** to **Strongly Disagree**. The questions in these sections also elicited "NA" (Not Applicable) responses, however, those were not considered for scoring purposes.

Reliability of the Instrument

In order to assess the reliability of the instrument, pilot testing was performed with 22 teachers from different schools of western New York from an accessible population. Those teachers who participated in the pilot test, did not participate in the study .

Questionnaires were given to other 23 non-randomly selected teachers from schools in Erie and Niagara counties of Western New York. (see Appendix for questions). Alpha Reliability coefficients were computed for each section and are shown as follows:

Alpha Reliability Coefficient		
Section A: Computer Training & Knowledge	0.76 (Present)	0.73 (Preferred)
Section B: Computer Comfortability	0.59 (Present)	0.75 (Preferred)
Section C: Computer Usage	0.61 (Present)	0.84 (Preferred)

Validity of the Instrument

The researcher assessed the instrument for face and content validity. Subjects in the pilot study were asked if they felt these items measured the concept they were designed to measure. Eight judges were also asked to give their opinions about the validity of the sections. Among these eight judges who reviewed the questionnaire; six of them were University faculty members, one was an elementary school teacher, and the other person was teaching in an area college. Two of the faculty members and two other judges were involved professionally in the field of instructional technology. All of the eight judges approved the questionnaire.

Design of the Study

Variables

Since the purpose of the study was to determine use of computers as an instructional tool, "Computer Usage" (in both "Present" and "Preferred" situations) was the dependent variable. The eleven questions in Section C were the measures of the dependent variable. Computer Training & Knowledge and Computer Comfortability are the two independent variables.

Statistics employed in data analyses included Mean, Standard deviation, *t*-test, and Correlation. The *t*-tests for correlated samples were calculated to determine whether or not there were significant differences of means between teachers' present and preferred

responses for the three sections A, B, and C. The study also involved correlating present and preferred scores within each of the three sections A, B, and C

Research Hypotheses

The purpose of the study was to examine the present and preferred situations of the elementary grade teachers in respect to using computers for classroom instruction. On Computer Training and Knowledge, Computer Comfortability and Computer Usage teachers' scores in the present situation is lower than their preferred scores. These hypotheses were tested using *t*-tests. Further, there is a positive correlation between teachers' Computer Training and Knowledge and computer usage, Computer Comfortability and Computer Usage. This hypothesis was tested using Pearson "r" correlation.

RESULTS

Test of Hypotheses

Analysis of t-test

On Computer Training and Knowledge, teachers' scores in the present situation is lower than their preferred scores. This hypothesis was tested using a *t*-test.

Table 1a shows the mean score and standard deviation for present and preferred scores for teachers with respect to their Computer Training and Knowledge.

Table 1a. Mean score and standard deviation for present and preferred scores for teachers with respect to their Computer Training and Knowledge (Section B).

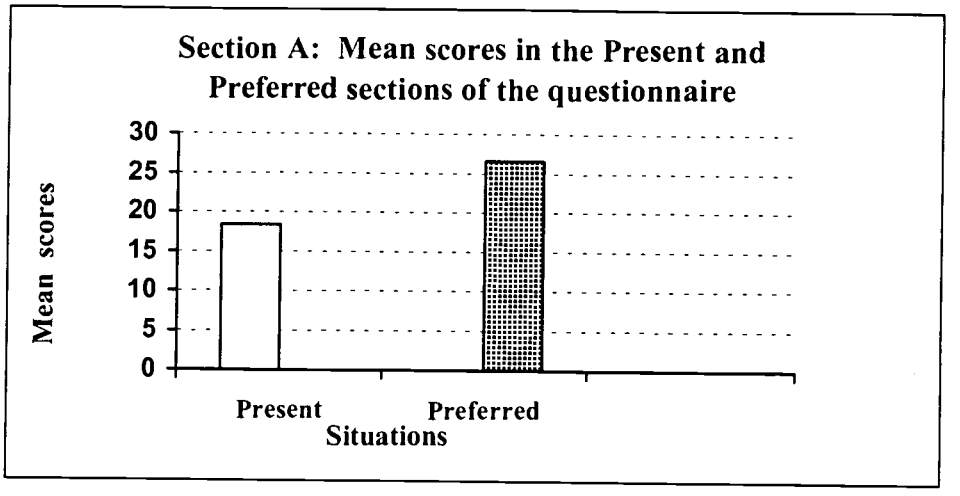
Teachers (n=149) Section A		
Present Mean SD	**Preferred Mean SD**	***t*-value**
18.38 (5.83)	26.62 (6.73)	14.61*

Please note: * means that the *t*-values are significant at $p < 0.05$

In Section A, the mean scores obtained for Teachers' present situation was 18.38 and that of preferred situation was 26.62, and the standard deviation for preferred situation was higher (6.73) than that of present situation (5.83). Teacher's score on computer training and knowledge in preferred situation were significantly higher (26.62>18.38) than the scores obtained for present situation. The *t*-value (14.61) is statistically significant at 0.05 ($p<0.05$).

Figure 1a gives graphical representation of the scores obtained in present and preferred situations.

Figure 1a. Mean scores obtained in present and preferred situations in Section B (Computer Training and Knowledge).



The higher mean scores in preferred situation (26.62) suggested that teachers' expectations of computer training and on subsequent knowledge was higher than what had been offered in present situation (18.38) and the *t*-test score (14.61, $p<0.05$) indicated a significant difference. **Thus the first hypothesis was accepted.**

The differences in responses to present and preferred situations on each individual item in Section A of the questionnaire were examined.

Table 1b shows the results obtained in each of the seven questions in Section B along with the corresponding *t*-values.

Table 1b. Mean scores, standard deviations and *t*-values of each item in the present and preferred situations in Section B (Computer Training and Knowledge).

	Teachers n=149 Present		Preferred		
Category	**Mean**	**SD**	**Mean**	**SD**	***t*-values**
1. District provided training	3.49	(1.46)	4.38	(1.60)	5.73 *
2. Availed training by district	3.10	(1.94)	3.97	(1.58)	5.96 *
3. Availed training outside district	1.15	(1.18)	2.31	(1.83)	9.06 *
4. School is well equipped with computers	3.28	(1.31)	4.44	(1.10)	9.43 *
5. Assistance available in school	2.70	(1.37)	4.46	(1.10)	13.50 *
6. See myself more knowledgeable	2.43	(1.33)	3.71	(1.32)	11.20 *
7. Others see me as more knowledgeable	2.21	(1.40)	3.33	(1.50)	9.08 *

Please note: * means that the *t*-values are significant at $p < 0.05$

As seen from Table 1b, with respect to item 1, teachers preferred having their school districts provide significantly more computer training, than that they were currently receiving (4.38>3.49).

Examining items 2 and 3, it could be stated even if the training opportunities were provided within or outside their school districts, most teachers did not take the opportunity, however, they indicated that they preferred to do so (training within district: 3.97>3.10, and training outside district: 2.31>1.15). Teachers' responses indicated that teachers preferred getting training within the school district as opposed to receive training outside the district.

With respect to item 4, the teachers wanted to see their schools better equipped with computers and instructional technology in comparison to the present situation (4.44>3.28).

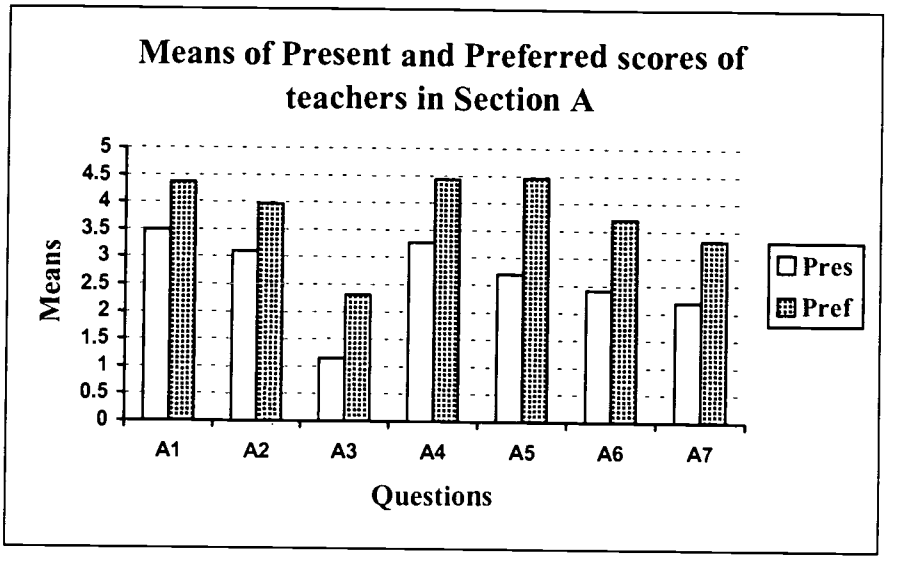
Examining item 5, when using computers for classroom instruction, although teachers preferred to have assistance available to them when needed, in general it was not available to the extent of their needs. In this regard, mean score obtained in present situation was low as compared to the preferred situation (2.70<4.46).

In items 6 and 7, responding to the questions on self evaluation, teachers wanted to be more competent in using computers than they are at present (3.71>2.43) and would like to be viewed the same by their peers or other school personnel (3.33>2.21).

Table 1b presents the corresponding t-values for each of the seven questions that teachers responded and all of them are statistically significant. The level of significance indicated for the values of *t*-statistics was 0.05 ($p<0.05$). This further indicated significant difference in teachers' preferred and present situation relating to their computer training and knowledge.

Figure 1b gives a graphical representation of the mean scores obtained in present and preferred situation of each individual item in Section B with regard to teachers' computer training and subsequent knowledge.

Figure 1b. Mean scores obtained in present and preferred situations of each individual item in Section A (Computer Training and Knowledge).



On Computer Comfortability, teachers' scores in the present situation is lower than their preferred scores. This hypothesis was tested using a *t*-test.

Table 2a shows the total mean and standard deviation for present and preferred scores for teachers with respect to their computer comfortability.

Table 2a. Mean score and standard deviation for present and preferred scores for teachers with respect to their Computer Comfortability (Section B).

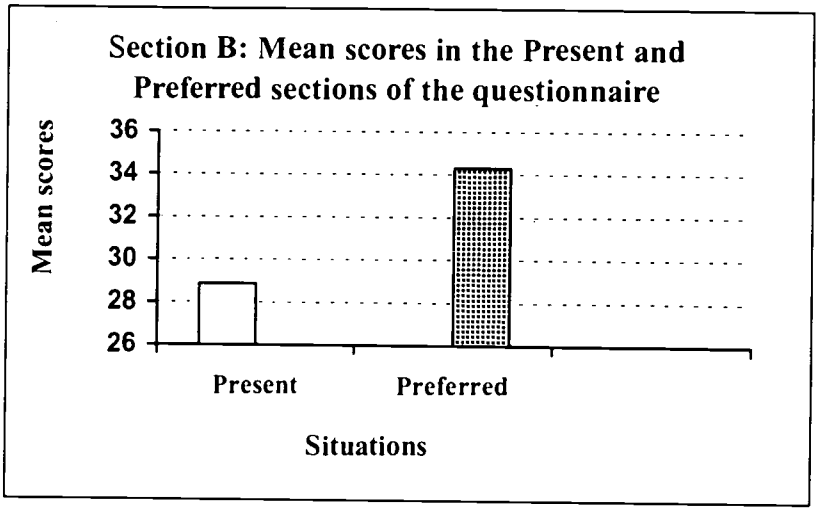
Teachers (n=149) Section B			
	Present Mean SD	**Preferred** Mean SD	***t*-value**
	28.86 (8.41)	34.32 (8.30)	9.19*

Please note: * means that the *t*-values are significant at $p < 0.05$

In Section B part of the questionnaire, mean scores obtained for Teachers' preferred situation was higher than that of present situation (34.32>28.86). Standard deviation in both cases (preferred and present situation) were almost the same. Table 2a shows the computed *t*-value for present and preferred scores to be 9.19 and statistically significant at $p<0.05$.

The following figure (Figure 2a) graphically represents the mean scores obtained in both Present and Preferred situations in Section B.

Figure 2a. Mean scores obtained in both present and preferred situations in Section B (Computer Usage in classroom instruction).



The significantly higher mean scores in preferred situation suggested that teachers preferred to be more comfortable in using computers than what they were experiencing at present. **Thus the second hypothesis was accepted.**

The differences in responses to Present and Preferred situation on each individual item were also examined.

Table 2b shows the results obtained in each question in Section B along with the corresponding *t*-values.

Table 2b. Mean scores, standard deviations and *t*-values of each item in the present and preferred situations in Section B (Computer Comfortability).

	Teachers n=149				
	Present		Preferred		
Category	**Mean**	**SD**	**Mean**	**SD**	***t*-values**
1. Comfortable using computers	3.38	(1.35)	4.37	(1.17)	9.46 *
2. Computers enhance teaching abilities	3.56	(1.25)	4.17	(1.11)	6.55 *
3. Comfortable discussing computers	3.17	(1.33)	4.22	(1.10)	9.83 *
4. Intimidated by students' question	3.23	(1.34)	4.24	(1.18)	8.36 *
5. Computers improve student performance	3.78	(1.18)	4.00	(1.24)	2.54 *
6. Computers help individualized instruction	3.35	(1.52)	3.63	(1.61)	3.00 *
7. Number of students in computer integration	1.95	(1.35)	2.84	(1.82)	7.34 *
8. Computers increase students' motivation	3.36	(1.56)	3.89	(1.50)	4.84 *
9. Traditional methods as effective as CAI	3.05	(1.31)	2.92	(1.60)	-1.09

Please note: * means that the *t*-values are significant at $p < 0.05$

In Table 3b with respect to item 1, data indicated that teachers preferred to be more comfortable in using computers in the classroom as compared to their present situation (4.37>3.38). It suggested that teachers felt an urge for greater competence to fulfill their need. Furthermore, examining items 2 and 3, teachers believed that computers would enhance their teaching ability more (4.17) than what they currently practice (3.56) and also that they would like to be more comfortable discussing computer topics with their students (4.22>3.17).

Results from item 4 suggested, that if computers were to be used for classroom instruction, teachers would be more intimidated by students' questions in preferred situation (mean score: 4.24) as compared to the present situation (3.23).

In item 5, teachers' response indicated that they preferred to see instructional computing improve students' performance (4.00>3.78).

Also, in item 6, the teachers wanted computer aided instruction to more effectively facilitate individualized instruction than in the present situation (3.63 for preferred, as compared to 3.35 for present situation).

With respect to item 7, teachers preferred to be more comfortable than what they were experiencing during the present situation in their ability to integrate computers in the classroom in presence of large number of students.

From item 8, it could be stated that there was a marginal difference in teachers' preferred (mean score: 3.89) and present (mean score: 3.36) situation in using computers in classrooms to increase students' motivation.

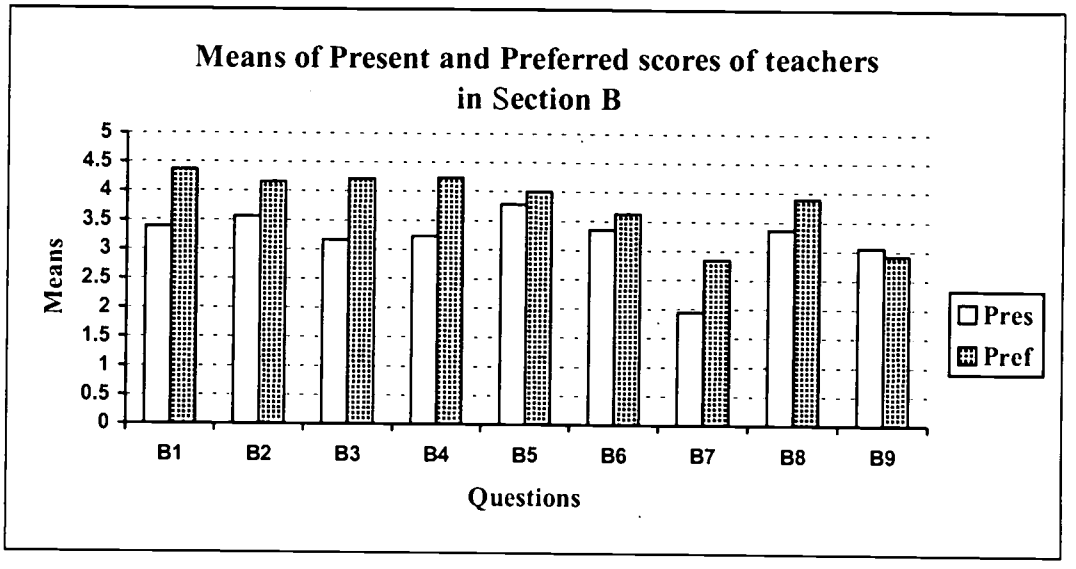
Responding to item 9, on traditional methods of classroom instruction being as effective as computer aided instruction, teachers' responses for the items were statistically not significant (3.05>2.92).

Table 2b data presents the corresponding *t*-values of all of the nine questions in Section C. All of the questions are statistically significant at $p<.05$ level of significance except for question 9. This in general, indicates significant difference in teachers' preferred and present situations relating to their computer comfortability. However, from teachers' response to question 9 suggested no statistically significant difference in

teachers' responses to teaching effectiveness through computer aided instruction as compared to traditional methods in present and preferred situation.

Figure 2b gives a graphical representation of the mean scores obtained in present and preferred situation with regard to teachers' computer comfortability.

Figure 2b. Mean scores obtained in present and preferred situations of each individual item in Section B (Computer Comfortability).



On Computer Usage, teachers' scores in the present situation is lower than their preference scores. This hypothesis was tested using a *t*-test.

Table 3a gives the total mean and standard deviation for Present and Preferred scores for teachers with respect to their computer usage.

Table 3a. Mean score and standard deviation for present and preferred scores for teachers with respect to their Computer Usage in classroom instruction (Section C).

Teachers (n=149) Section C			
Present		**Preferred**	***t*-value**
Mean	**SD**	**Mean**	**SD**
27.72	(10.69)	40.64	(12.11) 15.19*

Please note: * means that the *t*-values are significant at $p < 0.05$

In Section C, on teachers' computer usage in classroom instruction, teachers' responses showed that the mean scores obtained for Teachers' Preferred situation was higher than that of Present situation (40.64>27.72). Standard deviation in preferred situation was 12.11 and same for present situation was 10.69. The *t*-value is 15.19 and that is significant at $p < 0.05$.

Figure 3a graphically shows the mean scores obtained in present and preferred situations in Section C.

Figure 3a. Mean scores obtained in present and preferred situations in Section C (Computer Usage in classroom instruction).

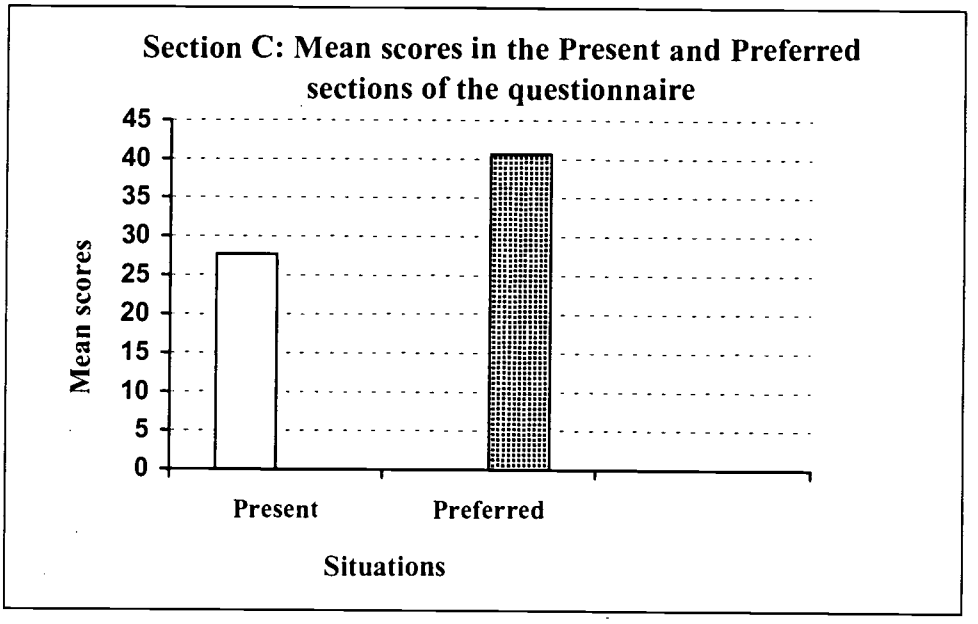


Figure 3a is a graphical representation of Table 3a. The significantly higher mean scores in the preferred situation (40.64) indicated teachers' preference for using computers is greater than their use of them in the Present situation (27.72). The *t*-value (15.19) is statistically significant at 0.05 ($p<0.05$). **Thus the third hypothesis was accepted.**

The differences in responses to Present and Preferred situation on each individual item of Section C that relates to teachers' computer usage were also examined and are presented in Table 3b.

Table 3b shows the results obtained in each question in Section C along with the corresponding *t*-values.

Table 3b. Mean scores, standard deviations and *t*-values of each item in the present and preferred situations in Section C (Computer Usage in classroom instruction).

	Teachers n=149				
	Present		Preferred		
Category	**Mean**	**SD**	**Mean**	**SD**	***t*-values**
1. Use computers as a tutorial aid	3.09	(1.52)	3.99	(1.24)	8.14 *
2. Use computers for students' records	2.52	(1.79)	3.57	(1.63)	8.54 *
3. Use computers for developing concepts	2.80	(1.53)	3.89	(1.25)	9.91 *
4. Use computers for problem solving	2.59	(1.44)	3.69	(1.50)	9.81 *
5. Use computers for drill and practice	3.42	(1.38)	3.97	(1.22)	4.78 *
6. Use computers for instructional games	3.00	(1.52)	3.73	(1.35)	7.21 *
7. Use computers as a general tool	3.64	(1.66)	4.13	(1.50)	4.23 *
8. Use computers to access information	2.07	(1.79)	3.65	(1.87)	11.30 *
9. Use computers for Listserv	0.73	(1.09)	2.99	(2.07)	14.61 *
10. Use computers for presentation graphics	1.51	(1.56)	3.17	(1.96)	11.88 *
11. Plan curriculum with computer integration	2.27	(1.47)	3.77	(1.49)	12.07 *

Please note: * means that the *t*-values are significant at $p < 0.05$

With respect to item 1, the mean score data given in Table 3b suggested that teachers preferred to use computers as a tutorial aid for students than in their present teaching situation (3.99>3.09).

Examining item 2, it could be stated that teachers preferred using computers to maintain and update students' records more than what they did at present (3.57>2.52).

In item 3, the teachers stated their preference over present situation (3.89>2.80) in using computers to help students develop concepts.

With respect to items 4 and 5, teachers' responses indicated that they preferred computer usage (3.69>2.59) for students in problem solving and they would also prefer over present situation, to use computers for students' drill and practice (3.97>3.42).

Responding to their views on computer usage to teach instructional games, in item 6, teachers showed their preference once again (3.73>3.00) thereby indicating their limited usage at present situation.

Teachers' willingness to use computers as a general tool in item 7, further confirmed their support for computer usage. In this case their mean score for preferred situation was greater than the present situation (4.13>3.64).

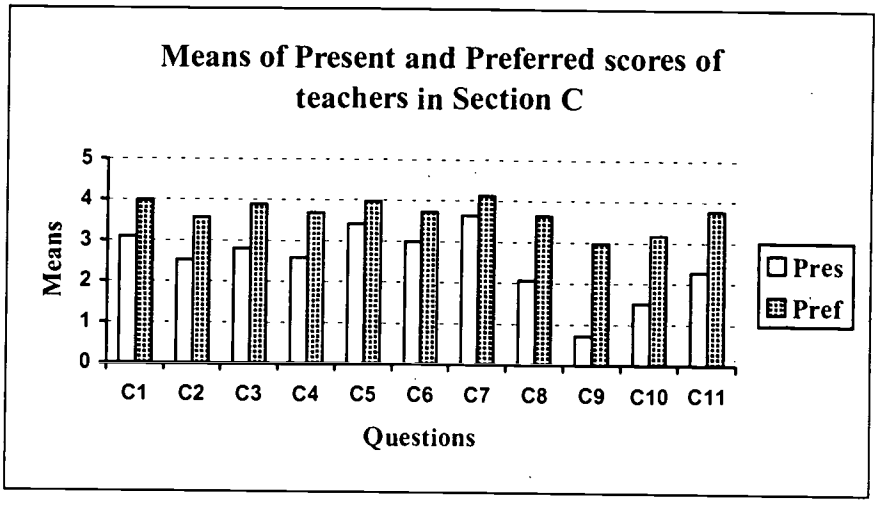
Next three items 8, 9 and 10 referred to computer usage to access information, using computers for Listserv, and for creating and using presentation graphics. In all these instances, teachers' mean score in preferred situation were considerably higher than that of the present situation. In case of accessing information, mean score in preferred situation was 3.65 as opposed to 2.07 for present situation. For using Listserv as a teaching tool, the mean score for preferred situation was much higher (2.99) than that of present situation (0.73), and in using computers for presentation graphics, teachers mean score was 3.17 for preferred situation compared to 1.51 for present situation.

Lastly, in item 11, when asked, if they plan to integrate technology in curriculum instruction, teachers' responses clearly indicated their strong preference over present situation. The mean score obtained for Preferred situation was 3.77 compared to the mean score of 2.27 for Present situation.

The *t*-values shown in Table 3b indicated teachers' responses to Section C questions on present and preferred situations to be all statistically significant at 0.05 ($p<0.05$).

Figure 3b gives a graphical representation of the mean scores obtained in present and preferred situation with regard to the computer usage.

Figure 3b. Mean scores obtained in Present and Preferred situations of individual item in Section C (Computer Usage in classroom instruction).



Analysis of Correlation

In order to determine if teachers' experience and interest in computers were related to their computer usage, scores obtained through their responses both in the Present and Preferred situations were correlated. Similarly, teachers' responses relating to computer training and knowledge, and also their computer comfortability were correlated with their computer usage. These responses were represented by the rating scale scores for each of the measured variables.

The **fourth** hypothesis predicted a direct positive relationship between teachers' computer training and knowledge and the computer usage. To elaborate, teachers' having more training and knowledge in computers would use computers more frequently in the classrooms. In this situation, since scores for the question items were in interval scale, the Pearson's "r" statistic was used.

Total scores obtained in Section A (teachers' computer training and knowledge) in present and preferred situations were correlated with teachers' scores in Section C (computer usage) in corresponding situations.

Considering the present situation, teachers' score in computer training and knowledge was correlated with teachers' score in computer usage. The correlation coefficient obtained was, r = 0.52 and indicated a moderate positive correlation. This value had statistical significance at alpha level 0.05.

In the preferred situation. correlation between teachers' score on computer training and knowledge with their score in computer usage yielded, r = 0.57. This also represented a moderate, positive correlation and the value was statistically significant ($p<0.05$). **Thus the fourth hypothesis was accepted**.

The **fifth** hypothesis predicted a direct positive relationship between teachers' scores in computer comfortability and scores obtained in computer usage rating scale. It stated that teachers' having high score in computer comfortability rating scale would use computers more often in classroom instructions. The computed Section B (teachers' computer comfortability) scores in present and preferred situations were correlated correspondingly with present and preferred scores in Section C (teachers' computer usage).

In present situation, teachers' score in computer comfortability was correlated with teachers' computer usage score. The correlation coefficient was found to be, r = 0.72 and represented high positive correlation. This value was statistically significant at alpha level 0.05.

Analyzing preferred situation, correlation was done between teachers' score on computer comfortability and of their computer usage. In this situation, the correlation coefficient of $r = 0.62$ also indicated a high positive correlation. This value was statistically significant ($p<0.05$). **Thus the fifth hypothesis was accepted.**

DISCUSSION

This study analyzed the use, utility, training needs and availability of computers from the perspective of the teachers. Such an approach added to the body of knowledge needed to inform educators who seek optimum use of computers in educating American youths.

Results indicated that the teachers wanted to see themselves more knowledgeable with computers than what they are now (3.71>2.43) and they preferred (mean score: 4.37) to be more comfortable in using computers than what they were at their present situation (mean score: 3.38). The study also examined the extent to which elementary grade teachers were satisfied with the training they received and the extent to which they desired more training. Mean score results obtained from the responses given by the teachers indicated that teachers wanted to receive more computer training than they received at their present situation (preferred 4.38 > present 3.49). Although teachers stated that they would like to take the opportunity of computer training provided by the district, in reality they often did not take them when offered. Also, most of the teachers did not avail themselves of the computer training offered outside school district. Thus, whether training was offered within or outside school district, not all teachers took advantage of these training opportunities despite their indicated preference for more

computer training. This raised two important questions - i) were the training appropriate for the teachers? or ii) were there other factors discouraging or preventing teachers from more fully utilizing training opportunities? It seemed logical to conclude that if teachers do not get adequate and appropriate computer training, then they would not be able to help children use computers in the classroom at the optimum level.

This research gathered data that compared elementary grade teachers' "present" situation to the teachers' "preferred" situation with regard to their perceptions on computer training, comfortability and computer usage. This allowed one to determine whether teachers felt if the status quo was acceptable or whether or not they saw the need for the change. It is important that teachers be given the opportunities to rethink and analyze their usage of computers in the classroom on the basis of training they received, how much training they desired, how competent were they, and how comfortable did they feel and their willingness to be comfortable with computers in classrooms. Generally in all three categories teachers were not content with the status quo. Data indicated that teachers preferred more training (preferred 4.38>present 3.49) in computers to enhance their level of computer competency, and also, they preferred to be more comfortable (preferred 4.37>present 3.38) in using computers in classroom instruction.

Further, the teachers stated that they believed computers improve student performance (mean score in present situation: 3.78), helps individualize instruction (mean score in present situation: 3.35) and increase students' motivation (mean score in present situation: 3.36). Respective mean scores for the above in preferred situation (4.00, 3.63, and 3.89) indicate teachers' willingness to use computers more to complement the attributes.

Based on teachers' responses, significant differences were found between teachers' present computer training, level of comfort, and computer usage in the classrooms as compared to their preferred training, comfort, and usage. A positive relation was found between computer training and computer usage in classroom instruction in both present and preferred situations. Data indicated a positive correlation between teachers' perceived computer knowledge and computer usage in both present and preferred situations. Further, a positive correlation showed a relationship between computer comfortability and computer usage in both situations.

CONCLUSIONS

All teachers at elementary grade levels, irrespective of their prior teaching experience, should be computer proficient and competent in computer instruction. The fact that most teachers did not avail computer training opportunities, although they had preferred to do so, the effectiveness of training should be examined.

Due to rapid technological changes, schools should update resources and continue providing training and workshops for teachers. To benefit the society at large, school districts must create an exhaustive plan to make the resources available to each school to promote computer use and eradicate the inequality of resources among schools.

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Appendix

SURVEY QUESTIONNAIRE

Elementary Grade Teachers' Perception of Computer Training and Usage in Present and Preferred Situation in Classroom Instruction

Demographic Information

1. Gender (circle one) : Male Female

2. Highest Degree earned : _____

3. Major : _____ _____
   Undergraduate Graduate

4. How long have you been teaching? : 0-5 years 6-10 years more than 10 years

5. Grade level you currently teach : PreK-3rd grade 4 - 6th grade

6. Class enrollment (present average class size if more than one) : _____

7. Average daily class attendance : _____

8. Type of computers available for your students' use at school : _____

9. Number of computers available for your students at school : _____

10. How often do your students have access to computers at school? : daily weekly monthly never

11. To what extent does your supervisor encourage you to integrate computers into the curriculum. : never seldom usually frequently.

SECTION - A
(Computer Training & Knowledge)

Instruction:

The following questions relate to your personal experience with instructional computing in your **PRESENT** teaching situation, and that of your **PREFERRED** situation. Please indicate your opinions (as denoted numerically) by answering both the **PRESENT** and **PREFERRED** situations.

Opinions

Strongly Agree	5
Agree	4
Moderately Agree	3
Disagree	2
Strongly Disagree	1
Not Applicable	NA

PRESENT			**PREFERRED**
5 4 3 2 1 NA	1.	I think that my school district provides computer training opportunities to meet my needs for classroom instruction.	5 4 3 2 1 NA
5 4 3 2 1 NA	2.	In the past year I took advantage of the computer training opportunities for teachers provided by my school district.	5 4 3 2 1 NA
5 4 3 2 1 NA	3.	In the past year I took full advantage of the available computer training opportunities for teachers offered outside my school district. (including formal course work)	5 4 3 2 1 NA
5 4 3 2 1 NA	4.	In terms of instructional computers & technology, I feel that my school is relatively well equipped.	5 4 3 2 1 NA
5 4 3 2 1 NA	5.	When I use computers for classroom instruction, assistance is available in my school when needed.	5 4 3 2 1 NA
5 4 3 2 1 NA	6.	I see myself as one of the more knowledgeable computer users in my school.	5 4 3 2 1 NA
5 4 3 2 1 NA	7.	Other school personnel see me as one of the more knowledgeable computer users in my school.	5 4 3 2 1 NA

SECTION - B
(Computer Comfortability)

Instruction:

The following questions relate to your personal experience with instructional computing in your **PRESENT** teaching situation, and that of your **PREFERRED** situation. Please indicate your opinions (as denoted numerically) by answering both the **PRESENT** and **PREFERRED** situations.

Opinions

Strongly Agree	5
Agree	4
Moderately Agree	3
Disagree	2
Strongly Disagree	1
Not Applicable	NA

PRESENT		PREFERRED
5 4 3 2 1 NA	1. I am comfortable using computers in my classroom.	5 4 3 2 1 NA
5 4 3 2 1 NA	2. I believe that using computers enhance my teaching abilities.	5 4 3 2 1 NA
5 4 3 2 1 NA	3. I feel comfortable discussing computer technology with my students.	5 4 3 2 1 NA
5 4 3 2 1 NA	4. I feel intimidated when students ask questions about computers.	5 4 3 2 1 NA
5 4 3 2 1 NA	5. I think Instructional computing will help improve students' overall performance.	5 4 3 2 1 NA
5 4 3 2 1 NA	6. I think that Computer Assisted Instruction (CAI) facilitates individualized instruction.	5 4 3 2 1 NA
5 4 3 2 1 NA	7. The large number of students in my classroom doesn't affect my ability to integrate computers into the curriculum.	5 4 3 2 1 NA
5 4 3 2 1 NA	8. By using computer technology in the classroom, I have increased my students' motivation.	5 4 3 2 1 NA
5 4 3 2 1 NA	9. I believe that the traditional methods of classroom Is as effective as CAI.	5 4 3 2 1 NA

SECTION - C
(Computer Usage)

Instruction:

The following questions relate to your personal experience with instructional computing in your **PRESENT** teaching situation, and that of your **PREFERRED** situation. Please indicate your opinions (as denoted numerically) by answering both the **PRESENT** and **PREFERRED** situations.

Opinions

Strongly Agree	5
Agree	4
Moderately Agree	3
Disagree	2
Strongly Disagree	1
Not Applicable	NA

PRESENT			**PREFERRED**
5 4 3 2 1 NA	1.	I use the computer as a tutorial aid for students.	5 4 3 2 1 NA
5 4 3 2 1 NA	2.	I use the computer for maintaining and updating students' records.	5 4 3 2 1 NA
5 4 3 2 1 NA	3.	I use the computer to help students develop concepts.	5 4 3 2 1 NA
5 4 3 2 1 NA	4.	I have my students use computers for problem solving.	5 4 3 2 1 NA
5 4 3 2 1 NA	5.	I use the computer for students' drill and practice.	5 4 3 2 1 NA
5 4 3 2 1 NA	6.	I teach instructional games by using the computer.	5 4 3 2 1 NA
5 4 3 2 1 NA	7.	I use the computer as a general tool (word processing, spreadsheets etc.).	5 4 3 2 1 NA
5 4 3 2 1 NA	8.	I use the computer as a way to access information (Internet, Database, CD ROM etc.).	5 4 3 2 1 NA
5 4 3 2 1 NA	9.	I use Listserv (e-mail) as a teaching tool with the help of computer.	5 4 3 2 1 NA
5 4 3 2 1 NA	10.	I teach students how to create and use presentation graphics that are available on the computer.	5 4 3 2 1 NA
5 4 3 2 1 NA	11.	I plan curriculum instruction with the integration of computer technology in mind.	5 4 3 2 1 NA

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