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Are We All Technically Prepared?—Teachers' Perspective on the Causes of Comfort or Discomfort in Using Computers at Elementary Grade Teaching

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This study investigated elementary grade teachers' personal experience with instructional computing in classroom instruction and depicts the causes of comfort or discomfort among teachers in using computers at elementary grade teaching. The specific study involved ten elementary grade teachers from randomly selected schools in Western New York. Open-ended investigative questions were used to guide the interview sessions. The results revealed a disparity of opinion between teachers who are more comfortable in using computers over others.

This article argues that elementary teachers will play no small roles in ensuring that American schools meet the growing demands for competent and creative users of computers. It follows then that how well elementary grade teachers are prepared for this role is critical. The article further contends that an important element, often overlooked, is that how they view themselves as players in the field must not be overlooked. This study investigated elementary teachers' personal experience with instructional computing in classroom instruction but more importantly identified some key causes of comfort or discomfort when using this technology in the classroom. It is a qualitative study involving 10 elementary grade teachers from randomly selected elementary schools in Western New York. These teachers were selected from a larger population of 149 teachers previously involved in a quantitative

study on the same subject (Guha, 2001). Prior to conducting the qualitative research, demographic information of the subjects were obtained from the responses given by the 149 elementary grade teachers who answered a validated survey questionnaire pertaining to teachers' computer use in the classrooms. Then four primary areas were investigated. They were: (a) experience and interest in instructional computing, (b) computer training and knowledge, (c) comfort level in using computers for teaching, and (d) actual computer usage in classroom instruction. The teachers answered the questions on a 5-point, close-ended, Likert-type scale. Scores obtained from the 149 teachers on all four sections of the questionnaire were listed in descending order. Based on the listed scores, 10 teachers were selected for interviews to investigate the causes of their comfort or discomfort in using computers for classroom instruction. Five teachers who scored high in the survey were designated as members of the "high scoring group" or "more comfortable" in using computers for classroom instruction and the five teachers who scored low in the survey comprised the "low scoring group" or "less comfortable" in using computers for classroom instruction. Open-ended interviews were used to initiate and guide investigative questions while allowing free response. The information thus obtained, permitted comparing and contrasting the responses. Among these themes were the following: (a) both high-scoring and low-scoring teachers embraced the use of computers to enhance students' learning and all wanted to be competent in their use; (b) those teachers identified as "less comfortable" tended to prefer network computers as opposed to stand alone units while the latter were frequently used by teachers who were "more comfortable" using computers in the classroom; and (c) the "less comfortable" teachers in using computers mentioned class load, and time management as being obstructive in implementing computer-aided instruction in the classroom.

RESEARCH QUESTION

It is generally agreed that in every segment of modern life, especially in developed countries, and increasingly in developing countries as well, computers play a critical role. Not surprisingly American society expects its schools to be competent users, intelligent consumers, and creative contributors to what many call the "computer revolution." Indeed they expect them to be the best, able to meet the needs at home, and challenges from abroad. This mission cannot be achieved without teachers who are confident, qualified, and motivated to provide needed instruction and visionary educational

leadership. Yet, in considering the complex questions of how best to achieve these ends, which teachers in principle almost universally embrace, one area is almost always overlooked, that is, teachers' self-perception, that is, how do teachers feel about what they can do with the hardware and software in their hands, and how they can command this rapidly as tools to teach, and teach well. This critical element needs a stronger knowledge base if college educators and other educational leaders are to devise efficient and effective courses, seminars, and workshops toward that end. To help gather information for that knowledge base, this study investigates the following question:

What are some factors associated with perceptions of teachers who indicate their comfort when using computers for instruction when compared with those not comfortable with this technology?

REVIEW OF LITERATURE

Some Pertinent Issues About Computer Training

Glenn and Carrier (1989) suggested that technology training plays an important part in teachers' successful adoption and implementation of computers into their classrooms. Nonetheless, Stasz and Shavelson (1985) saw a major problem. They contended that the integration of computers with subject matter into the classroom was the least well addressed issue in the teacher workshops. As supported by this investigator, Anderson (1983) believed that "if computers are to be integrated into the elementary and secondary school curriculum, then teachers need to be trained in computer use."

Availability of Computers but Insufficient Computer Training

Another issue had to do with the use of available facilities. Preskill (1988) argued that while availability of software and hardware has increased, "teachers still face barriers to effectively using computer technology to enhance the learning outcomes of their students." Cited as major barriers for teachers were the need for more information and training so that teachers understand how to integrate computers into their classrooms. Glenn and Carrier (1989) saw another part of the problem. They indicated that although teacher education programs are attempting to incorporate technology into the "methods" course, teachers may not have received sufficient training for incorporating the technology into instruction. Stasz, Shavelson, and

Stasz, (1986) appeared to agree stating that "lack of adequately trained teachers present a major obstacle to effective instructional use of computers." They claimed that teachers receive less than 10 hours of hands-on computer training prior to using computers in their classroom, woefully inadequate for their needs.

Lacina (1984) pointed out that although computer aided instruction is needed, teachers cannot teach using computers if they are not competent. 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 elementary schools, few teachers regularly use the school-owned microcomputer with their students. Neufeld (1984) specifically addressed the levels of computer competencies needed by the teachers for appropriate usage in classroom instructions.

Computer Usage Difficulties in the Classroom

Bychowski and Van Dusseldorp (1984) indicated that the teachers generally felt inadequate and frustrated regarding their competency of computer usage in the classroom. Mangan (1992) pointed out that teachers should be critical about computerized education and begin to insist on a more serious role in defining and directing the appropriate use of information processing and computer technology in their classroom instructions. Spotts and Bowman (1995), noted a rather startling view. They believed "although a majority of the faculty report that instructional technologies are important to their teaching, the reality suggests that fewer will actually be using them in their teaching in the near future." Novak and Knowles (1991) looked at beginning teachers, their research revealed that as the beginning teachers struggle to survive and settle into their new role as a teachers, they do not emphasize computer usage simply because they view computers as "extra" and "special," not as a tool to enhance teaching or instructional methods. As they gain confidence and experience, he contended they use computers for many classroom activities. Unfortunately their actions are limited because they feel "time constrained." Other investigators focused on barriers to using computers in the classroom. For instance, Ely (1993), studied computer usage in schools and universities and further mentioned that "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...." Sheingold and Hadley (1990) concluded that the five highest barriers to the use of computers by teachers already using computers are: (a) lack of time,

(b) scheduling computer time, (c) too few computers, (d) not enough time in school schedule for computer-based instruction, and (e) inadequate financial support for computers. Ely's barrier list of eight, with some overlapping of the preceding were: (a) dissatisfaction with the status quo, (b) insufficient knowledge and skill, (c) lack of resources, (d) available time, (e) commitment from supervisors, (f) lack of inspiration from leadership contingents, (g) lack of rewards or incentives, and (h) participation expected, not shared. Winnans and Brown (1992) conducted a study among 150 teachers from the fourth and fifth grade classes in the mid-west looking for factors that affect elementary teachers' use of computers. Teachers reported that lack of self-efficacy and confidence being one of the major issues. Also, they did not want to be accountable for teaching computers to the students and grading them at the same time. Other factors included, lack of a computer resource person in the school for them to seek assistance from if a situation arises, limited use of computer related sources, materials provided by the district, and the limited number of computers that were available to them.

Teachers' Resistance to Using Computers in the Classroom

As there are external barriers, there are internal blocks as well. One is teachers' resistance, the reasons for which there are several. In one study Hannifin and Savenye (1993) explored teachers' resistance to the new role that accompanies computer usage in the classroom. They mentioned teachers' resistance to microcomputer usage. Poorly designed software applications and lack of time to design their own software often cause teachers to give up at an early stage of adoption into the classroom. Some teachers resent the computer because they see it as a competitor for the student's attention (McMahon, 1990). Lack of administrative support and an increased 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). Beaver (1990) noted that research of a teacher-training program in New York showed that over one half of the future teachers never used a computer. 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 noncoercive environment.

Zaidel (1991) stated, "integrated thematic units keep student interest high and tie subject together. They also provide you with a good way to engage kids in regular computer use." The author further suggested that if themes include computer lessons and have the kids take turns at one computer or go to a computer lab at a scheduled time, there will be a learning boost across the curriculum.

Teachers' Personality Factors and Computer Usage

Katz (1992) claimed that certain personality traits were related to teachers' tendency to be computer users in the classroom. Katz (1992), using the Eysenckian personality model, suggested that the personality profiles of teachers making the most use of computers in the classroom were likely to be positive toward innovation and change; flexible, creative, nonconforming, calm, self-confident, impulsive, sensation-seeking, stimulus-seeking, and boisterous. This is a relatively new approach in terms of systematic study but if true, certainly needs attention and strategies to address these factors. More study seems appropriate.

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 children's education in the use of computers. In fact, the need is urgent, not only because of its ubiquitous presence but also due to its rapid change. This objective though, can best be achieved by beginning at the elementary school level. As at all other levels, the critical requirement is that there be effective and intensive computer training of teachers if schools are to meet society's technology needs. Competency and comfort of use is a creditable goal. As Preskill (1988) contended, "the teachers' comfort level and understanding of how computer technology can be used in education must be increased." How best to achieve these goals is a major problem. Few studies have investigated elementary teachers' perception of computer usage in classroom instruction. Not many have attempted to look at the problem through the eyes of the elementary school teacher. Nevertheless, McGinnis et al., (1991) studied the beliefs and perceived needs of science teachers towards the uses of computing technologies. The findings from the study indicated that a majority of elementary grade teachers agreed that computers would improve teachers' science instruction, whereas most of the middle and high school teachers did not agree. Although research findings indicated the importance of computer training, only few teachers are major computer users (Becker, 1991). Hence, teachers' perception of their computer training should be understood, and taken into consideration. This would specifically identify the type of training

that teachers need for using computers in classroom instruction and the methods they would find suitable in their teaching styles. 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 preinstalled software, available through the network. School district authorities, however, chose these programs, and teachers had no choice in selecting computer programs that they felt would meet individual needs of their students. Analyzing the case, it may be appropriate to presume that since teachers interact with students on a regular basis, their views on software selection should be considered. Furthermore, studies should be conducted to understand the state of the art regarding computer-aided instruction and of teachers' computer usage in the classroom.

Computer applications being ubiquitous, students place demands on teachers about information resources, and various class related activities. To the students, teachers represent the answering storage. As students know more about computers through their daily interaction with electronic toys, video games, and the Internet, they expect teachers to be knowledgeable in the area of computer usage as well. First of all, the teachers need to have computer knowledge and enhance their ability to cope with computers. This relates to teachers' current computer application and subsequent preference. As students face effects of computer revolution, teachers on the other hand, need to be computer literate to face students' demand. It will remain perennial as computers hold the realm of the future with the continued quest for knowledge. "Early exposure to computers is always a good thing, and computer skills are built up progressively and cumulatively" (Mangan, 1992). If we are to prepare children to be more able and competitive, there is a need for research that explores teachers' perceptions and knowledge regarding the use of computers in the classroom. Educators have to monitor the training process to see the progress in instructional methods and how it complements with society's technology usage. They must examine the entire educational "ecosystem" if they are to effect any lasting changes.

METHODOLOGY

Sample

In a previous study (Guha, 2001), 15 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%) taught at all grades PreK-6. With regard to their teaching experience, 86 teachers (58%) had more than 10 years of teaching experience, 33 teachers (22%) had between 6-10 years, and 30 teachers (20%) had less than 5 years of teaching experience. These teachers had participated in a previous study relating to their use of computer in four areas. 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, Stoddart, Horan, Niederhauser, & Bradshaw, 1992; Peters, O'Brien, Briscoe, & Korth, 1995; Price & Brunson, 1986; Smith, 1995). The format of the questionnaire was adopted from an instrument developed by Milbrath and Doyno (1987). These areas were distilled from careful analyses of planned interviews with eight college instructors. Based on the outcome of these initiatives, these four areas of study emerged: (a) experience and interest in instructional computing, (b) computer training and knowledge, (c) comfort level in using computers for teaching, and (d) actual computer usage in classroom instruction. A questionnaire was developed and standardized. Participants responded to items on the instrument that used a 5-point, close-ended, Likert-type scale. The number 5 indicated greatest comfort with computers and 1, lowest comfort. Measures were taken to assure anonymity and scores were calculated for each of the 149 teachers by adding the items to arrive at a total score for each participant. Ranking was arranged in descending order. Based upon the listed scores, 10 teachers were selected for more in depth interviews as to the underlying causes of their comfort or discomfort in using computers for classroom instruction. The five teachers who scored high, were labeled as the "high scoring group" or "more comfortable" in using computers for classroom instruction and the five teachers who scored low were considered as the "low scoring group" or "less comfortable" in using computers for classroom instruction. The labels were for internal use only as a part of the continuing effort to avoid attaching any stigma to the terms low scoring and high scoring since no scores indicated right or wrong or best or worst. They only referred to those more comfortable and those less comfortable in instructional computing. Among the five high scoring teachers, three were male and two female teachers. Of the five low scoring teachers, there was one male and four female teachers.

The interviews were carried out in private and separate sessions for each participant. Each session lasted for 30 to 45 minutes. Responses were recorded on audiotape but only after requesting permission from the participants, which fortunately was granted in all cases. Prior clearances had been obtained from the school principal. Notes were also taken during the sessions. An open guide for questions was used but allowance was made for a natural flow of conversation (Appendix A).

Citing McGalliard (1983), Henry (1995) stated that often there are inconsistencies between professed beliefs of teachers and instructional practices. The ultimate objective is to benefit children in their learning process, and by knowing the true underlying factors, school administrators could take appropriate measures to fulfill their objectives. Hence, an examination of teachers' responses to the interview questions was necessary to further illustrate findings and characterize teachers' implicit beliefs and perceptions. In this study, there were two groups of interviewees selected from two extreme levels, for comparison and contrast. Indications of how computers were being used in the classrooms, level of teachers' comfort in using computers, and teachers' perceptions on computer related issues in teaching practices were all supported by the direct quotes from teachers in this regard.

At the beginning of each session, the teachers were asked to express their general views on computer usage in classroom instructions. They then expressed their opinions as to how students could benefit from the use of computer assisted instructions in the classroom.

The second question elicited teachers' perceptions of the major problems they faced in using computers as instructional tools in the classroom. The thinking was that if teachers were to incorporate computers in the classroom teaching, their views on any problems they might have faced or considered a barrier must be understood.

Teachers were asked if any changes occurred in their teaching practices when they used computers in classroom instruction. Where there were reports of changes, respondents were asked to expand on the nature and extent of those changes.

Another question concerned perceived needs. What instructions did they feel were needed to help them become more comfortable with computers. Following that, the investigator asked them to share their views on the future of computers in classroom instruction. This was followed by an inquiry into types of computer application teachers used most often and reasons for their choices.

For teachers to facilitate students' learning process, it is imperative that they assess their students' computer abilities; hence teachers were asked to describe their students' abilities in the classroom. Since the primary objective in computer assisted instruction is to benefit the students, the extent of

students' exposure to computers has been related to their level of understanding and knowledge in computers. Therefore, teachers' comments were necessary to learn whether or not they believed students would benefit by having computers at home. Although it appeared that installing computers in the classrooms would automatically steer teaching methods in a newer direction, in reality, it relies completely on teachers and how they implement the use of it. This could only be answered if teachers stated any opportunities they had taken to implement new ideas when using computer aided instruction. Despite the fact that teachers are responsible for classroom instruction, it is the respective schools and school districts that should provide the technical support. Teachers' responses to the question, "Describe the technical help available to you when needed," would reflect the status of the present situation in the schools.

The last question that was asked of teachers was about the type of parental feedback they received relating to computer aided instruction. The question was asked to investigate how parents react to the implementation of computer aided instruction at the schools and about their children's exposure to newer learning methods.

Procedure

The interviews started with questions at a high level of generality. Then, it involved asking a series of predetermined questions with follow-ups as perceived appropriate based on responses to the questions or view, and opinions offered by the respondents. All inquiries were open-ended. Teachers responded to 11 questions. The interview sessions lasted 30 to 45 minutes in recognition of limited time teachers could give to this research project. The interviews were audio taped and later transcribed, compared with session notes, and analyzed.

The data analysis task was to systematically synthesize these transcribed materials to answer the research questions. In order to facilitate better understanding of the questions and corresponding responses, two sections were formed. Further, the responses were divided into "high scores" meaning teachers who were most comfortable in using computers, and "low scores" referring to teachers who were least comfortable with computer usage.

Therefore, the sequence to be used in the presentation of the interview findings is as follows:

1. The questions were stated, each preceded by a brief rationale.
2. Synthesized responses of teachers from both high and low groups were formulated, presented, documented, and in some cases quoted verbatim.

FINDINGS

The interview findings are presented on a question by question basis.

Teachers' Responses

Q1: How do you feel in general about using computers in classroom instruction?

This question was designed to gain information on teachers' views about computers in teaching practices and how students could benefit from computer aided instruction. Descriptions of teachers' responses are as follows.

High Scoring Group

For teachers with high scores, it was found that irrespective of their teaching levels (whether it was PreK-3 or grade 4-6), all of them had positive feeling about using computers in classroom instructions. They found computers useful in reinforcing students' skills and their easy accessibility to information. Teachers readily acknowledged computers' potential in students' learning process. As one of the PreK-3 grade teacher explained:

> Computers are great and wonderful for encoding and decoding. Computers are beneficial for individualized instruction at student's rate. Students' could explore avenues and resources. Teachers can give topics and specific software and let kids take off. Using computers to remedial skills, you can capitalize their interest. Moreover, it gives opportunity for parent volunteers to work with kids on computers.

As a strong proponent of computer use in classroom instruction, a teacher from grade 4-6 made the following comments:

> Using the computer is not a privilege, but something that is mandatory. The world is changing and students have to keep up to the change. Computers have a definite place in the classroom. It supplements and reinforces what the teacher is instructing…students do not have to always rely on the teachers as they can have the feedback from the computer…even in free time the computer is beneficial, where there is a mixture of ability level.

Low Scoring Group

Teachers with low scores also believed the importance of computer aided instruction in the classroom. One of the teachers, teaching grades 4 -6, was quite excited about having the opportunity to use computers for classroom instruction. She provided the following rationale in explaining why she felt computers are useful:

> I love using computers in the classroom. The children use the computers for research, encyclopedia programs, for science and social studies, math practice, and time tables. It also helps the student who is frustrated with spelling, writing, and editing. Students' feel proud of their work when they see what they can accomplish. A student who has bad hand writing, likes to work on a computer and feels proud.

One of the teachers reported that it was not always the case that teachers totally deviated from their current teaching practices and embrace computers. However, they understood the importance of computers in learning and instruction. A PreK-3 grade teacher from the low scoring group said:

> ... a computer should be available whenever you need it. It is a valuable tool like an encyclopedia. It is just another means. It does offer you an access more than any library could have. It helps in organizing information. It is a great tool for eye-hand coordination. At first we saw the computer as a wonderful toy but now we see it's utility. It is not a replacement of a teacher and I am telling you from a first grade teacher's view point.

Constructive criticism thus provided a relevant framework to examine the ways teachers perceived the usage of computers in classroom instructions.

Q2: What do you think are the major problems faced by teachers in using computers in the classroom?

If teachers are to incorporate computers in their teaching practices then there must be an effort to find out if they experience any problems in using computers in classroom instruction. If any, then those should be clearly stated so that appropriate measures can be taken.

High Scoring Group

The high scoring group of teachers indicated that the number of computers available in their classrooms were insufficient. If teachers were to implement computer aided instruction they must have access to the appropriate hardware and software to familiarize them first and then guide students accordingly. A Teacher from the high scoring group believed that quite a number of teachers were "computer phobic." As one of the teachers from grade 4-6 stated:

> Our biggest problem is that a lot of teachers are afraid of computers. Several resources are available. To become more aware of computers' ability, teachers need not be afraid of computers but should learn them. With technology changes it is difficult for teachers and schools to keep up with.

Another teacher from grade PreK-3 mentioned "computer phobia" being the main problem in using computers in the classroom. She further stated: "... some teachers do not have training...initially a lot of phobia, now that teachers have computers at home they have less fear in using them."

Interestingly, a teacher from grade 4-6, cited non-availability of modern computers being the problem. He said: "Availability is the problem. No modern computer in the classroom, only Apple IIe. The lab has IBM and Macintosh, but teachers are afraid of them. Some of them do not see the use of them."

Low Scoring Group

Teachers from the low scoring group complained about time management, inadequate number of computers in the class, and lack of computer training. One of the teachers from grade 4-6 expressed her frustration: "Time management is the major problem. Also we are limited to one computer, and that is not enough for 24 students."

Another teacher indicated insufficient number of computers in the class. Her comments were: "Children cannot read. So, teachers need to be with them. Children need help all the time...one computer for all children is not enough."

Regarding computer training for teachers, almost all the teachers explicitly stated that they did not have sufficient training. They thought that appropriate training would definitely make them more comfortable in using computers. As one of them said: "Lack of teacher training is the major problem.

School has to fit in some training time as a number of teachers cannot learn quickly and not all have computers at home."

Also, some of the teachers mentioned that the computers in their schools were not up to date as they are still using Apple IIes.

Q3: Have you observed any change in your teaching practices as a result of using computer-aided instruction? If yes, what are they?

One of the goals was to find the influence of computer aided instruction in the classrooms. This question was designed to determine if teachers believed that computers do, in fact, cause change in their teaching practices.

High Scoring Group

Almost all the teachers from the high scoring group acknowledged changes in their teaching practices as a result of computer aided instruction. They stated that with computers, they could have students do a lot of publishing work, produce materials using multimedia, and look for quality. To substantiate these views, one of them remarked on her change in teaching practices: "... now I tend to do more themes. Kids spend more time on a topic and computer aided instruction allows the class to put together a nice project with text and illustrations....it encourages them to think and certainly make them aware of their work. About her own work, she reported that she could do more reports and work independently now.

Describing the positive changes that occurred in his teaching practices, a teacher from grade 4-6 said: "... now I am able to have students produce materials that are better for them. They are able to use multimedia and bring in video, audio, still pictures from a lot of different sources."

Only one respondent in this group, teaching at grade 4-6 commented that his teaching practices did not change significantly since he teaches hands-on-activities. However, he indicated that computer aided instruction had helped him reinforce math concepts and students feel proud about using computers.

Low Scoring Group

Respondents from the "low scoring group" also indicated their interest in making changes to their teaching practices. Some teachers already noticed the change in their lesson plans, and some could feel the necessity of

change. As one of the teachers from grade 4-6 stated: “I use computers for word processing a lot more than before. Even, I use math quizzes, and prepare newsletters for parents. Children participate in other activities for bulletin boards and science projects. Also, we use computers for grading, class list and to try different fonts.”

Although one teacher from grade PreK-3 mentioned not observing any change in her teaching practices as a result of computer aided instruction in the classroom, she explicitly stated using computers at the media center in her school. She further commented: “We do stories and read along with the computer. Children are more interested in generating their own stories. Children like to get on the computers. They pull out letters and words they know.... more you use more you want to use—it is addictive.”

Teachers’ responses reflected the extent of their computer usage and how it was related to their current teaching practices.

Q4. What kind of instructions do you feel that you need to make yourself more comfortable in using computers in classroom instruction?

There are learning processes which teachers can adopt to become more comfortable in using computers. Since teachers interact with the students on a day-to-day basis, it was important to get their views and beliefs so that certain instructions could be provided to them as per their requirement, thereby making them more competent in computer aided instruction process.

High Scoring Group

Teachers from the high scoring group claimed to be quite comfortable in using computers in classroom instructions. They preferred to be up to date in terms of basic computer applications and the Internet. They wanted to learn more about web pages. A grade 4-6 teacher was quite excited about having computers in the classroom and expressed her feelings by saying: “…I would like to stay top on the latest math and science software and hands on science program, social studies materials and others. We need to learn about the best Internet sites and more about educational web pages.”

While teachers commented on having some computer courses available in schools, they wanted more time for them to practice and get better in computer aided instructions. As another teacher from grade 4-6 explained: “I am a hands-on person. I need time and access to play on computers. Procedure sheets are good and the technical department send people to teach us, but we want more practice time.”

Low Scoring Group

For teachers from the low scoring group, the level of comfort in using computers in the classroom was different than their colleagues from the high scoring group. Their general view was that teachers need more training in computers. They also felt the need for computer workshops for teachers at the schools. This would benefit students as well. As one PreK-3 grade teacher pointed out: "We need more workshops....In the workshop the trainer should do one or a couple of things and then we need more time to sit and play with it.... As I get better, students will get better too. I realized computers are children's thing and they just have to know it."

Some teachers complained about not having enough time to practice. One of the teachers admitted that she resisted the use of computers for a while but now as she learned how to use them, she became more comfortable. However, she felt that teachers needed more time to sit and play with the computers. Also, teachers knew that there were programs available, but they needed to classify them as per students' grade level and their ability. They felt that guidance was needed from a computer competent faculty member during staff development. As one PreK-3 grade teacher commented:

> I need to be familiar with more programs and then only I will know if they are appropriate for our grade level. For example, activities in one particular program were beyond students' skills. There was nothing in the area of reading and phonics skills. We have some math counting activities. Some programs are not fit for the students....model from someone is most effective.

Q5. What does the future look like to you regarding computer usage in the classroom?

Primarily, students' learning process depends upon what they are being exposed to in the classroom. With the current trend of technology usage in daily activities, it is expected that sooner or later the mode of classroom instruction is going to change. However, teachers are in a better position to reflect on this issue. Hence, this question justified the reason and probed into teachers' perspectives relating to the same.

High Scoring Group

Responses from teachers with the higher scores group indicated a tremendous potential of computer usage in the classroom. They expected the

involvement of both teachers and students in computer related subjects where learning would be more interactive. Teachers also indicated various multimedia programs that would probably be used in computer aided instruction. Speaking of developing better communication, a teacher from grade 4-6 believed: "There will be more communication and interaction in the future as computer awareness grows among teachers. Students will be able to talk about any topic in China or in France and this would help students' broaden their multicultural awareness."

Another teacher from the same grade level indicated that computers would facilitate in real time learning and students will get more access and current news events. He further focused on more computer usage in classroom to benefit students' learning process. A PreK-3 grade teacher was very optimistic about future use of computers in classrooms. He said: "Ideally, it should be networked in and outside the building for kids to access the public library....children should get involved with the global picture....world should be more closer and available for them.

Low Scoring Group

Responses from teachers in the low scoring group believed the same as the other group of teachers. Viewing the importance of computers, one PreK-3 grade teacher advised: "....make sure that every child should use computer. Keep a check list."

She further commented on how computers could be used for writing stories. She kept those in the journals. Children could have their own writing and publishing workshop. She admitted that although new, she was using computers more now as she could see computers being used every day in the classrooms.

A teacher from grade 4-6 mentioned that the number of computers in the classroom would increase and there would be ways for teachers to use them. The future of computer usage looked quite promising and teachers' would be more knowledgeable if schools had computer labs for instruction purposes. A PreK-3 grade teacher supported the statement by saying: "We will use computers more and we are getting 5 computers with a teaching station. We would like to have a lab for instruction. I can only see computers' usage getting more and more."

Viewing the responses from both groups of teachers, it could be stated that teachers were quite interested to learn more as they could see more usage of computers in all aspect of teaching and learning processes.

Q6. What computer applications do you use the most in the classroom? (example: word processing like Microsoft Word, Word Perfect*; presentation package like* Power Point*; computational software like* Excel, Lotus*). Why do you use that most?*

The use of computer applications has been identified as a strategy to be used in a broad range of computer usage in classroom activities and instruction. Teachers' responses indicated very specific applications in which they involve students in the learning process.

High Scoring Group

In mentioning computer application software, the teachers from high scoring group stated using the word processing software the most. It included *Microsoft Word*, *ClarisWorks*, and sometimes *Word Perfect*. These software packages being user friendly were used for students' publishing purposes and also for teachers to make lesson plans and writing reports. One of the teachers from grade 4-6 was quite thrilled in using *ClarisWorks* and her experience was: "I use *ClarisWorks* the most for word processing, writing research papers, poetry, making outlines and web pages. I use *Number Munchers* and *Base 10 Blocks* for math. Also, other math software, which is educationally appropriate."

She further stated: "....I do grades on *Excel*. *ClarisWorks* is used for worksheets, vocabulary sheets, pre-writing sheets for the workshop program. It helps me tailor activities to what I am teaching other than publisher's ideas."

Another teacher from the same group and teaching at the same grade level indicated *Microsoft Word* as her preference for word processing purposes. She stated that she used other software as well. She said: "I use *Microsoft Word* for word processing, *Microsoft Works* for lesson plans and spreadsheets for grading. Children use math and limited science programs."

Low Scoring Group

Microsoft Word was also the choice of teachers from the low scoring group. They used this particular software for word processing purposes. They mentioned that children preferred windows based programs, and that teachers would use them if they were curriculum related. Teachers also emphasized using math program, as one of the PreK-3 grade teacher pointed out: "I use math and writing programs for reinforcement. I use math skill

software for teaching children addition, subtraction, multiplication, and division. Children do it independently."

Teachers' responses thus provided much needed information that would assist school administrators in optimizing their resources when selecting software packages that were user friendly for teachers and students. This would enable more teachers to use it in classroom instructions.

Q7. How would you describe your students' ability to use computers in the classroom?

To facilitate students' learning process it was desirable for the teachers to identify and understand students' abilities in using computers in the classroom. This would further assist teachers in students' assessment and then proceed with the computer instruction as deemed appropriate.

High Scoring Group

All the teachers from high scoring group found that the students in their classrooms were quite able to use computers. They indicated that there weren't any significant differences among students' computer knowledge base. The teachers observed that students felt proud when they used computers. A grade 4-6 teacher commented: "I am surprised. Students' backgrounds are higher than what I expected....some are learning how to make finished product. They are not afraid at all."

Another teacher commented on her students' ability to use the computers in the class. Her statement was: "Some are excellent in computers. Keyboarding skills are not good. Although the students have limited access, they pick up things quick. Their ability is wonderful."

Low Scoring Group

With regard to teachers' perception of students' ability to use computers in the classroom, respondents from low scoring group indicated that most of the students know how to use computers and they loved to play with them. A PreK-3 grade teacher was more specific. She said: "Students are far better than what I thought. They are learning quickly, even faster than me...there is no fear among children. I am willing to experiment in taking chances and risks."

Another teacher from the same grade level affirmed children's ability by her following comments:

> ...at school they (children) are fascinated to know that it (computers) can do something more other than playing games. They (children) love mouse practice. We are at entry level. They are getting better and faster. Children want to get on computers. Computer is another tool and children love it.

Since, teachers' objectives are to facilitate students' learning process, their assessment of student ability would allow them to structure the computer aided instruction in a way that students would be motivated and make use of computers in the classroom more enjoyable and informative.

Q8. What do you think are the benefits for students to have computers at home?

The primary objective in computer aided instruction is to benefit the students. Students are exposed to various learning materials as information access becomes easier. It enhances their learning process. With technological advancement, it is beneficial when students are given the opportunity to be at pace with the scientific age. Although schools could promote usage of computers, schools have their limitations. Time and available resources were not sufficient for each child to have access to computers at school and practice at their own pace. Hence, teachers' comments were necessary to learn if they believed students would benefit from having computers at home.

High Scoring Group

Teachers from the high scoring group believed home computers were influential on students' ability in using computers. They reported that most of the students, almost 80% of them to be specific, have computers at home. One teacher explained the benefit of having computers at home: "Definitely there is a benefit. Children could experiment and see what works and show their friends in the classroom. They also use trial and error method to make certain things work on the computer."

Teachers also spoke about skill reinforcement. They indicated that students could do assignments at home and extend what they learned in the class. One of the teachers stated: "Students can access a lot of information, reinforce more and can get help in their language skills as they edit their work at home."

Low Scoring Group

Responses from the low scoring group of teachers also indicated their strong belief about the benefits that students would get by having computers at home. A PreK-3 grade teacher could see the positive effect of having computers at home and she said: "Children are able to get familiar if they have computers at home. They are motivated. Even the children who did not write journals wrote two stories on computers."

One of the grade 4-6 teachers clearly stated that there were eight students in her class who have computers at home and she believed those children were more knowledgeable than the other students in the class. This view was supported by another teacher from the same grade level. She said: "Students could continue practicing at home and get familiar with it. Home computers are handy and help students prepare skills too. Students become more comfortable."

However, a PreK-3 grade teacher felt that having computers at home would not matter in the first grade. But she indicated that having computers at home helped students to be more familiar with it.

These responses indicated teachers' beliefs and opinions on the importance of having computers at home to assist children in their learning. Teachers would like students to perform better in the class, hence, they would encourage the usage of any tool that motivates students and reinforce their skills so that students can excel in their learning process.

Q9. Have you had any opportunity to implement new ideas when using computer aided instruction?

This question has been structured to reveal whether or not teachers were motivated to use computers and implement new ideas in their classroom instructions. Even if teachers had new ideas in using computers for instruction purposes, were they voicing their ideas and were they getting enough encouragement and support to implement those ideas?

High Scoring Group

There were mixed responses from the high scoring group of teachers. Some of the teachers implemented new ideas to reinforce students' skills, and publishing students' works, whereas, some other teachers complained about limited time they have to try new ideas. They reported about "being stuck" in their routine work. Moreover, some of the high scoring group of

teachers mentioned that all the software are networked from a central point in their school district. The teachers felt frustrated because they could not show any software to the students outside the network and also could not try any newer strategies or teaching methods.

One teacher who gave positive response to the question made the following statement: "I try new software. For example I recommended the *Base 10 Block* math program. It helped students reinforce skills. There is a lot of new software coming up."

A 4-6th grade teacher availed himself of the opportunities he received in implementing new ideas in computer aided instruction. He had his 5th grade students publish in the school newspaper. He reported receiving full support from the school administrators in trying out new ideas in his class. His comment was: "Children are going to publish their work for people to read. I have a chance to display their projects, pictures, and poems. Administrators are open to ideas, anything new. They want you to try. They are very open and supportive."

Low Scoring Group

A majority of the teachers from low scoring group had negative responses to this question. But they indicated the possibility of implementing new ideas in the future. As one PreK-3 grade teacher explained: "No, I have not implemented any new ideas yet. I am not that far and it is only a start for me... I am just holding hands and trying to get through this. But, I will in the future."

Low scoring teachers indicated that due to their limited ability in using computers they preferred using networked computers. They claimed to have several new ideas and those who said to have implemented new ideas were not happy with the training received. At present they were doing the basics, but if they had a role model, they would be more comfortable in implementing those ideas. A teacher from PreK-3 grade supported this saying: "....we need somebody who is more knowledgeable so that we can get more ideas...we need to have a trained computer teacher...model is what is needed and teachers feel more comfortable and could learn more by watching the model."

If teachers are to motivate the children in their learning process, then the teachers must be allowed to try new ideas. So, it is well justified that teachers themselves need to implement new ideas using computers in their classroom instruction.

Q10. Could you please describe the technical help available to you when needed?

Although teachers' were responsible for their classroom instructions, it is the respective schools and school districts that should provide technical support to the teachers. For schools to fulfill their objectives to benefit students' learning process, they have to make teachers successful. They need to assist teachers in their implementation process. Responses from teachers reflected available resources and the schools' support that teachers' received in computer aided instruction processes.

High Scoring Group

In confirming schools continual support in providing technical assistance as needed, some teachers from high scoring group acknowledged schools encouragement to have teachers use computers in their classroom instructions. As one of the PreK-3 teachers said:

> For technical help there is a teacher resource manager whom we e-mail. By next day or sooner he will come and fix the problem. He is very busy....even if he cannot come, he e-mails back and suggests ways that I could fix the problem. There is also another faculty member who helps when there is a problem.

Another teacher from grade 4-6 stated: "We have a computer committee staff who helps with technology problems. Technology help is right away. The district has a support staff who comes within that day depending on the problem."

Nevertheless, one of the respondents teaching at grade 4-6 was not satisfied with the assistance she received. She felt she knew more than the technical helper.

Low Scoring Group

All the teachers from the low scoring group reported receiving technical assistance when they needed. They mentioned that each of the schools had either a media specialist or a technician to assist them. However, some of the teachers said that sometimes technical help comes a little late. They also reported that there weren't proficient with computers. One of the teachers from PreK-3 grade said she needed help most of the time. But she acknowledged receiving help too. She said:

> We scream for help. There is one person in every grade level who is on the technology committee. She will come over when we need help. Also, there is a media specialist whom we can call. She comes down when she can. They are our colleagues so it is difficult for them to come sometime but they help. There is a district person whom we call when there is a big trouble. So, we have help on our fingertips.

Teachers responses would be useful for the school administrators in assessing the resources. This would form a base for the teachers.

Q11. What kind of feedback do you get from parents on computer aided instruction?

Children need parents' encouragement in their learning process. Parents' feedback on computer aided instruction would also assist teachers in understanding and knowing the extent of motivation that parents see in their children relating to their computer use.

High Scoring Group

Responding to the question about parents' feedback on computer aided instruction, teachers from the high scoring group said that parents seldom make suggestions to them or to the school administrators. However, parents wanted their kids to be in the computer lab more often, and that they appreciated schools' interest in promoting computer aided instruction. One of the teachers commented:

> I do not get much feedback from parents. But parents like to see more computer work from their children. Our situation is not typical in terms of parent involvement. Parents are intimidated by the school. They appreciate schools' effort in using computers but they are not comfortable in coming to school and saying that they would support anything that helps their children.

Low Scoring Group

Like their counterparts in the high scoring group, teachers from the low scoring group mentioned low feedback from the parents. They said that some parents thought that schools did not need computers for instruction

purposes. Again, some parents saw the importance of computer usage and despite not knowing much about computers they were pleased to see them in the classrooms. A PreK-3 grade teacher observed: "...parents are excited about computer related conferences at school. Few parents attempted to explore. They are pleased to see computers in classroom."

Teachers' responses suggested that they would like to see parents think more about their involvement in their children's computer learning processes. If schools' objectives are to benefit students in their learning process through computer aided instruction, parental support is important, hence feedback from them is very essential.

DISCUSSION

The interviews being open-ended, helped gather detailed responses from the teachers. These interviews were conducted following the definition given by Kahn and Cannell (1957) who described them as a conversation with a purpose. The open-ended interview technique is appropriate where the researcher asks for facts and opinions of the respondents. This was also a focused interview however to accommodate time constraints of the respondents.

Both "high" and "low" scoring groups of teachers acknowledged the importance of computers in students' learning process and also agreed that computers helped them in their curriculum instruction. They further agreed that computers had generated children's interest because they are easy access to a universe of information, could broaden their learning horizons, and develop multicultural awareness. Teachers reported using computers to achieve key instructional goals, and also indicated that computers would assist students enhance their writing skills. A widely held view among these cohorts was that computer usage reinforced students' skills and enhanced their knowledge across all elementary grade levels. According to them, not only do the computers help in individualized instruction at the student's rate, they also assist students in exploring avenues and other resources through their vast capability in accessing information. They further stated that for children at lower grade, computers are great for eye-hand coordination and gets students more involved in the learning process. Teachers agreed that computers help students with spelling, writing, and editing. They found that students are not concerned about their handwriting and are encouraged to accomplish their task by typing the necessary documents. To all of them, "the computer is no longer a wonderful toy to play games, but a powerful tool which is more than a library and can be considered an alternate teaching means."

Respondents from both high and low scoring groups of teachers reported changes in their teaching practices as a result of computer aided instruction. One of the high scoring teachers indicated that although he taught hands-on activities, he used computers to reinforce math concepts. Responses elicited from the high scoring group of teachers during the interviews, revealed that some of them were quite enthusiastic about using computers and duly implemented new teaching strategies to reinforce students' skills and in publishing students' works. On the other hand, some of the low scoring teachers complained about extensive and exhaustive routine work that would not give them sufficient time to incorporate any new ideas in the classroom. They also indicated their inability to implement new ideas due to lack of computer knowledge.

Other teachers from the low scoring group, who showed interests in new ideas, mentioned the need of role models so that they would be comfortable in implementing their ideas in the classrooms. Some of the teachers from the high scoring group indicated that through instructional computing, they could act as facilitators to students' learning process as opposed to instructing the students to master certain topics. They focused on themes and allowed students in the class to put together projects. The teachers claimed, that computers helped students get motivated and become more interested in learning. In the book *Coping with Computers in the Elementary and Middle Schools*, Riedesel and Clements (1985) stated: "There are a number of ways in which microcomputer can help teach mathematical concepts, improve the logical thinking pattern of children, and solve problems posed in science and social studies." High scoring teachers indicated changes in their teaching methods as they incorporated computers in their lesson plans to cater to various needs of their students. This further related to the comments made by Dublin, Pressman, and Barnett (1997)

> ... computers are thus not just tools to accommodate or adapt to one other kind of students learner, but to a number of different kinds of learners ... it is important to note that the student who is fully integrated in the regular classroom can thrive in a number of important ways as a result of that integration, and that computers can be effective tools for facilitating the kind of integration that prevents students with special needs from becoming islands in the mainstream.

High scoring teachers could thereby feel the necessity of change as children responded to cooperative learning activities. They believed that with computers not only could they acquire information for themselves, but they could also use and manipulate the information to share with the children. In

their daily chore of activities, teachers often allowed students to write their own stories, published their works, and assisted students in their writing process. For this, teachers used computers for word processing a lot more than before. Some of the teachers reported using computers to manage students' information, for grading purposes, and for communication. They acknowledged that without computers these tasks would have been quite tedious. Low scoring teachers were comfortable using networked computers as opposed to high scoring teachers who preferred stand-alone units. The high scoring teachers believed that computers networked in the school system limited their opportunities to try newer strategies and teaching methods.

In general, students found computers fascinating. Although they just began keyboarding, teachers found children's ability to maneuver and use computers commendable. Unlike the high scoring teachers, some of the teachers from low scoring group were quite surprised at the students' ability in using computers. They stated that students were not afraid at all to use computers. The teachers mentioned that children at lower grade level in the elementary classes were eager to work on computers and loved mouse practice. The teachers admitted that majority of students in their classes had computers at home. Unlike few teachers, who felt that at elementary grade levels having computers at home was not important, most of them indicated that with computers at home, children could become more competent due to their familiarity with computers. All the teachers stated that with more practice, students could improve their skills. Further, they said that children liked to experiment in order to see what would work and then they could show the same to their friends in the classroom. This experimentation could only be possible if students had computers at home; because at school, the opportunities could be limited and with scheduled class time students would not have enough time to play around individually. Moreover, if students had computers at home, they could do their assignments and extend what they had already learned in the class. However, unlike the high scoring teachers, some of the low scoring teachers felt that in lower elementary grades, computers were introduced only to familiarize children with the technology, hence they did not think it was essential for children to have computers at home.

Most of the teachers reported using word-processing software such as *Microsoft Word* or *Word Perfect*. Some of them indicated their frequent usage of *ClarisWorks* for lesson plans and writing reports. Teachers revealed that their students liked window-based programs. These teachers would use them if they were curriculum related. For grading purposes, a few of the high scoring group of teachers used *Excel*. However, none of these teachers reported using *PowerPoint* or any other presentation software. Teachers reported that they frequently used math skill software for teaching addition,

subtraction, multiplication and division. Notably, some of them used *Number Munchers*, *Base 10 Blocks*, and other math software that they found educationally appropriate. Most of the teachers indicated the importance of Internet services; to them, it would not only act as a conduit to information sources, also, the Internet would allow children to be closer to wherever they wanted to be through virtual reality.

Teachers from high scoring group remarked that if they were to implement computer aided instruction, they must have appropriate hardware and software. They felt the need to get familiar with the system and then guide students accordingly. They complained about not having enough computers in the classrooms, indicating financial difficulties being the major cause. Teachers from the low scoring group voiced the same concern. They said that with only a few computers available they were limited in their class activities.

Teachers indicated receiving little response from the parents in terms of computer usage in the classrooms. Among the few showing interest, some parents were quite satisfied with the schools taking initiative in implementing computer aided instruction as they could see the necessity of computers in day to day activities. Teachers indicated that parents' support would assist raising funds through a bond issue.

One of the high scoring teachers remarked, that with technology changing at a faster pace, they would like to update themselves in knowing more about computer applications and the Internet. They definitely saw the need for teachers' ongoing training and staff development. Teachers felt that training would be more appropriate if given by the faculty member who was well versed in computer applications and could be a role model for them.

Teachers from low scoring group cited "time management" to be a problem as they were busy with their daily routine and were unable to fit in the computer time and integrate computers in curriculum instruction. They stated that even though they were trained in computer applications, they did not have enough time to practice and could not use computers with their students. With regard to teachers' availing themselves of computer training opportunities, some of the teachers from high scoring group mentioned "computer phobia" among other teachers. They believed that irrespective of available opportunities, these computer phobic teachers would be reluctant to even turn on the computer switch. As Preskill (1988) wrote "... many teachers are still skeptical of the value of computers have in education. The kinds of feelings towards computers range anywhere from hostility, to fear, to euphoria." It was surprising to see that even after more than a decade later, some teachers were still in the fear of darkness, whereas the technology carried the flame of advancement into a new era of information age. This

fear could only be eliminated if teachers receive more training in computers so as to become comfortable in using them in the classrooms.

According to Katz (1992), "... teachers are in the forefront of technological revolution that is overtaking the educational system and have the potential to increase efficiency within the teaching process by effectively utilizing the computer." So, for teachers to be effective in classroom teaching, they must be well trained and well prepared to facilitate students' learning process. They feared that children knew better than the teachers, hence they shied away from using computers. Some teachers did not want to fail in their teaching methods. This could well be related to the statement made by Vockell and Sweeney (1994). In their article *How do Teachers Who Use Computers Completely Differ From Other Teachers?* they stated , "... teachers tend to teach in the ways they themselves were taught; and if their instructors don't integrate computers into their instructional delivery systems, then they are not likely to do themselves." Teachers indicated that with time, more students would use computers, and with continuous technological advancement it was quite imperative that the teachers be proficient in computer usage to keep pace with newer technology and master the instructional techniques.

CONCLUSIONS

This study investigated perceptions of ten elementary grade teachers' pertaining to their comfort or discomfort in using computers. Based upon findings of the study, the following conclusions were drawn:

1. The elementary grade teachers supported computer integration in classroom instruction.
2. These teachers wanted to be competent in computer use and instruction as they could see positive changes in teaching strategies as a result of using this technology. Both the groups of teachers affirmed that computer assisted instruction not only helped in individualized instruction, but it also promoted cooperative learning.
3. There was an inequality of resources among the schools that caused disparity in computer usage among teachers as well as the differences in teachers' computer training opportunities, which in turn affect their abilities in terms of computer usage.
4. Low scoring teachers were comfortable using networked computers as opposed to high scoring teachers who preferred stand-alone units.

5. Unlike high scoring teachers, who indicated lack of availability of computers as a major problem, the low scoring teachers mentioned teaching loads and time management as their problems.
6. Teachers wanted Internet services to be available at schools.

RECOMMENDATIONS

The following recommendations are offered by the researcher:

Since computers aid students' learning, the school administrators should offer their continued support and encouragement to their teachers to integrate computers in classroom instruction.

All teachers at elementary grade levels, irrespective of their prior teaching experience, should be computer proficient and competent in computer instruction. Administrators should plan strategies and have resources available for teachers to develop an interest and acquire computer experience, as it would assist teachers in frequent use of computers. Schools need to have computers both within the network as well as stand alone units for teachers with various capabilities to use at their own discretion. School districts should arrange intensive training before the beginning of school or during the holiday breaks so that teachers have sufficient time to practice and be comfortable in using computers in the classrooms. 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. Schools must plan mandatory computer workshops for teachers to help them become computer literate so as to assist students in their learning process. A pretest and posttest analyses must be conducted in conjunction with these proposed workshops. A similar study is recommended to determine the perceptions of elementary grade teachers in other areas of the country and including the private schools. It is recommended that a similar study be made with equal number of male and female teachers in the sample. A follow-up study should be done to understand the specific training needs of the teachers to integrate computers in the classrooms. Another research study needs to be done to investigate the most effective method of integrating computers in the classrooms at elementary grade levels.

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