The Effect of the Use of Computers on Writing in a Second Grade Classroom

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The Effect of the Use of Computers on Writing in a Second Grade Classroom

THESIS

Submitted to the Graduate Committee of the Department of Education and Human Development State University of New York College at Brockport in partial fulfillment of the requirements for the Degree of Master of Science in Education

by

Kevin L. Manning

State University of New York College at Brockport
Brockport, New York
August 1994
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Abstract

This study was designed to investigate the effect of the use of the computer on the quality of second grade students' writing.

Twenty-five second grade students from a rural, public elementary school district in western New York participated in this study. The study consisted of a collection of two separate writing samples taken from the students. One was done on the computer while the other one was done by pencil and paper.

It was a counterbalance design in that twelve of the students did the first writing sample on the computer, while the other thirteen students did the first writing sample by pencil and paper using the same topic. The second writing sample reversed the order in which the students completed the writing sample on the computer and by pencil and paper using the second topic. The writing samples were scored holistically, with a 0 - 4, by the examiner and a second reader using a scoring rubric. A t test was used to analyze the data.

Results from the t test indicated that there was no statistically significant mean score difference between the computer group scores and the paper/pencil group scores on the holistically scored writing samples of second grade students.
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Chapter 1

Statement of the Problem

Purpose

The purpose of this study was to examine the effect of the use of the computer on the quality of second grade students' writing.

Need for the Study

It is important for educators to be aware of any possible benefits that computers can lend to the classroom learning environment, specifically writing. It is equally important for educators to be aware of any drawbacks or misconceptions about the use of the computer as a writing tool.

Is the computer a superior method with which to teach children the process of writing? Is it an alternative method to use along with pencil and paper? Is there little value to the use of the computer as a writing tool to develop better writers? These are the questions that need to be addressed in order to make a judgment about the use of the computer as a writing tool.

Is length a determining factor in the evaluation of writing samples that were done on the computer? In a study conducted by
Daiute (1986) on 57 grade seven and nine students whose revision and writing quality was examined, all of whom had extensive word processing experience, it was found that students produced lengthier pieces on the computer, and final computer-created essays were rated slightly higher than those written by hand. Daiute feels that the computer written stories were simply rated higher because of their added length. She also did not think that the added text was related to the text's existing content.

A great deal of anecdotal reportage exists to support the contention that word processing can have a positive impact on the quantity and quality of students' writing and revision (Bernhardt, Wojahn, & Edwards, 1988; Collier, 1983; Enberg, 1983; Fisher, 1983; Rodriques, 1985). Fewer empirical studies have been conducted to assess the quality of student revisions and final papers written on the computer. The majority of the well-controlled, large scale investigations that have been undertaken have used college freshmen as subjects. Most of these studies have reported significant improvements in the quality of writing of students using computers compared to pen and paper control groups (e.g. Bernhardt et al., 1988; Etchison, 1985).

There is not a considerable amount of research that has looked into the negative fallout from word processors. Most of the research at this time has a very positive, if not somewhat
biased leaning. There is also a likely tainting of result via the well known halo effect (Hooper, 1987). Research done in this area needs to be well designed with tight controls.

It would appear from the literature that the use of the computer as a writing tool has many positive benefits (Hooper, 1987). Research is definitely needed in this area to prepare the educators and students of today for tomorrow. Undoubtedly, in the future the computer will be a powerful instrument in the classroom and in many classrooms it already is. It would be wise to know how best to utilize this instrument for the betterment of the students as the move is made into the twenty-first century where computers will be a way of life.

Null Hypothesis

There will be no statistically significant mean score difference between the computer group scores and the pencil paper group scores on the holistically scored writing samples of second grade students.
Definitions

Holistic Scoring: Holistic scoring is a form of direct writing assessment. It is based on the theory that the whole is more than the sum of its part and that the most valid assessment of writing (content, organization, word choice, sentence structure, mechanics) work together to achieve an overall effect.

Scoring Rubric: A chart of categorized criteria for rating writing samples with scores of 0 - 4.

Limitations of the Study

If any student is adept at word processing prior to the study, he/she may score higher due to this experience.
Chapter II

Review of the Literature

Purpose

The purpose of this study was to examine the effect of the use of the computer on the quality of second grade students’ writing.

Computers and Writing

It is now an age of technology. With many technological discoveries and advances occurring so rapidly, educators must prepare students to move into a world where technology is a prominent force. Computers have been used for the advancement of many businesses and organizations for many years. Computers are becoming an important feature of many schools and are affecting growing numbers of language arts and English programs (Dickinson, 1986). Educators need to be aware of the benefits computers can offer their students. As educators prepare their students for an increased technologically oriented world, they also must utilize the technology that will best benefit the student.

The principal form of technology in use in today’s schools is the computer. One potentially powerful use of computers by young
Children is as a writing tool. Computers allow young writers to focus on spelling and content instead of penmanship, to encourage rapid and painless revision, and to produce attractive final drafts (Green, 1984; Phenix & Hannan, 1984). Other benefits have been attributed to the computer's ability to instantly print highly legible drafts. Students may derive far greater pleasure in seeing their work on paper and may be more likely to share it with others when it is neatly printed rather than illegibly handwritten. Students' ability to produce reports, newsletters, and "books" with a polished look for a real audience could promote a perception of writing as a meaningful form of communication which has a real personal value, as something in which the student can take pride (Bruce, Michaels, & Watson-Gegeo, 1985). The ability to produce a neat, printed copy can increase motivation and encourage writing for a wider audience. The editing power makes revision possible without tedious recopying, thus freeing students and teachers to approach writing as a process involving repeated drafts. Specific problems with handwriting and spelling can also be circumvented (MacArthur & Shneiderman, 1986). By facilitating the mechanics of revision, the use of a word processor may lead the student writer to work in a less constrained, more experimental fashion, risking new modes of expression in the knowledge that any text can be easily changed (Collier, 1983). The use of the word processor for revision does
have some advantages over the traditional method of transferring text from one handwritten page to another, and it does not appear to have any detrimental effects on revising strategies (Collier, 1983).

An increased interest and interaction among students who use the computer is also a common finding. The public nature of the screen may prompt students to read each other's work and so promote more peer review and editing (Dickenson, 1986). In a study conducted by Bruce, Michaels, and Watson-Gegeo (1985) with a sixth grade classroom in a lower class urban school in the northeast U.S., students attended a show and were then instructed to write a critique of the show using the computer for the rough and final draft. After composing the rough draft the students went back to the computer to make revisions. It was found that the time milling around the computer before being able to use it encouraged the students to read each other's writing and interact over it. These interactions affected both the content and form of student writing. Similarly, peer interactions during writing on the computer and student access to other students' work stored in the computer can affect students' understanding of purpose in writing, and their sense of audience.

In a study conducted by Owston, Murphy, and Wideman (1991)
One hundred eleven eighth grade students were asked to write a story on the computer and another story off the computer. Two writing tasks were developed. The tasks were pretested on students in another grade eight class in the school that was not part of the study. From this pretesting the task administration protocols were refined. The student papers also provided them with sufficient evidence to judge that the tasks were sufficiently similar to be considered equivalent. When competence, focus, support, and mechanics were evaluated the results showed a significant difference in favor of using the computer for two of these four factors, competence (p<.05) and mechanics (p<.01). Word counts were obtained using the word processing program WordPerfect. Draft and final versions of papers written on computer were found to be significantly longer than those written off computer when lengths were compared using the Wilcoxon matched pairs signed-ranks test.

Research also indicates that there is a strong motivational force for students who use the computer. Observations of students and attitude questionnaires have confirmed the motivational value of using word processing (Bean, 1983; Stromberg and Kurth, 1984). The benefits of the computer has also been seen in the interest level and skill development of the learning disabled child. Learning disabled students who had experienced great failure in learning to write responded positively to the use of word
processing (Kramer, 1984). Papert (1980) cited children in his MIT computer center who went from "total rejection of writing to an intense involvement (accompanied by rapid improvement in quality) within a few weeks of beginning to write with the computer" (p. 30). Suhol (1985) notes that a room full of word processing computers not only brings writers together but it also encourages a sense of accomplishment among the users, and that this community of writers provides a nearly ideal setting for collaborative learning. Teachers and researchers who observed children using word processors consistently report positive results. Kleiman and Humphrey (1982) reported that learning disabled children seven to sixteen years of age, many of whom had refused to do any kind of writing, began writing enthusiastically when permitted to use word processors. When word processors were introduced in the East York School in Canada, children began to "write more, edit more, and produce better compositions." (p. 97).

Kleiman and Humphrey (1982) state:

The most immediate result is that students want to write more often and produce longer compositions. Teachers of young children have reported that the length of the average essay doubles. The next change occurs when the children become familiar with the editing capabilities of the word processor. First they start being more careful to correct typing, spelling, and punctuation errors. Then they begin to change words and sentences. Finally they learn to reorganize the material, moving, adding, and deleting large sections of text. They no longer just edit for details, but also pay more attention to the meaning of ideas and the order of presentation (p.98).

Kerchner and Kistinger (1984) studied learning disabled
students who used word processors for a year with instruction based on a process approach to writing. The process approach stresses meaningful communication with a real audience and includes pre-writing activities, composition, conferencing with teachers and peers, revision, and publication (Calkins, 1980; Graves, 1983). The students made significant gains in writing ability in comparison with a control group that received no special intervention. It would appear that the use of the computer is beneficial to the writer, but also the instruction that is used with the computer must not be overlooked. Morocco and Neuman (1985) conducted a case study of learning disabled students in several resource room programs using word processors. They concluded that word processing could facilitate a narrow skills approach to writing based on correcting errors as well as a meaning-oriented process approach, and cautioned against analyzing the impact of word processing independent of the method of instruction.

Teachers and students with access to computers, accompanied by text-editing software and a high-speed printer, can now organize, enter, edit, format, and print out anything they might write. As Coburn, Kelman, Roberts, Snyder, Watt, and Weiner (1982) suggest, "a simple text editor allows the user to compose on the computer's video screen before committing words to paper."
Revision requires no erasing, cutting and pasting, and no tedious retyping [or rewriting] of subsequent drafts" (p.38). In addition they report that:

Schools using word processing programs have found that even young children will revise their work to correct punctuation, spelling, word selection, sentence structure, and the dozens of errors common to student writing, such as word and letter juxtaposition. Using word processing programs encourages students to write who might otherwise avoid writing. All students using such programs tend to write longer, more detailed stories and essays. As a side benefit, learning to use such programs properly often results in the students' overall improvement in following directions (p.38).

In an exploratory study with eighth grade students, Kane (1983) found that students composed more text using a word processor than with pencil and paper. The students also revised their writing more, both to change the organization and to modify individual words, phrases, and sentences. Some computer programs actually prompt the students to edit various features in their papers. Computer programs such as Writer's Workbench search student texts for certain errors in usage or various stylistic features (McDonald, Frase, Gringrich, & Keenan, 1982). Preliminary studies have suggested that students do not resent the error-hunting aspect of such processing of their texts (Sommers, 1982). Daiute, O'Brien, Shield, Liff, Wright, Mazur, and Jawitz (1983) conducted a year long study with junior high students working with a word processor that provided prompts and suggestions for revision based on limited textual analysis, e.g.,
checking for run-on sentences. They reported that both the word processor and the revision prompts led to more frequent and varied revisions.

Spelling checkers can help students compose more freely in the first stages of their composing, since they can concentrate on issues besides spelling as they compose. Spelling checkers will not find errors with homonyms, but the search-and-replace function of the word processor helps a writer who can identify his/her characteristic misspellings. The student can concentrate on one error at a time (Schwartz, 1984).

Although there is great interest in using word processing programs to help students develop interest and skill in revising, research in the area is still limited. Collier (1983) found that the use of a text editor increased the number and complexity of revision operations and encouraged greater manipulation of material at the word and phrase/clause level, but little whole text revision was accomplished by the students he observed. The quality of the student essays was not affected by the revision efforts of the students. However, Collier noted that the word processing system his students used was so difficult to master that much of their energy and time was devoted to learning to manipulate the word processing system itself.
In a study conducted by Kurth (1987) twenty eight sophomore and junior high students enrolled in a special class for interested writers at a university writing center. The subjects were randomly assigned to one of two groups. Fourteen students were assigned to the experimental group and were given composition instruction using computer word processing. Fourteen students were randomly assigned to the control group and were given composition instruction without the use of word processing. The same instructor taught both groups. The word processing group met on Monday and Wednesday afternoons for sixty minutes in a computer laboratory, while the nonprocessing group met on Tuesday and Thursday afternoons for sixty minutes in a regular classroom. Both groups met for twelve weeks, so each student received twenty four hours of instruction. Neither group was told about the activities in the other group.

The major focus of the instruction in both classes was expository writing. Students in both classes were taught prewriting skills, draft writing, revising, and editing skills, and were encouraged to use them. The teaching strategies for revision emphasized global revisions rather than surface or word level revisions.

All of the instructional objectives and instructional methods
were the same for the two groups. However, in the word processing group, each student had access to an Apple IIe or IBM computer and the Word Perfect word processing software. A spelling checking program was also available for the students' use in the word processing group. The students in the word processing group were given a short introduction to the use of the software by the course instructor. This instruction was limited to these word processing features: enter; retrieve document, save document; delete letter, word, line, block, and end of page; move sentence, paragraph, block; search; print; and exit.

The results indicated no significant difference between the two groups when length and amount of revisions were analyzed. An interesting finding was that even though the students in the word processing group had to take time for the key-boarding training and also had to learn to use the software, they managed to write as many compositions of equal or greater length during the class as did the students in the nonword processing group. The necessity of learning a word processing program did not appear to inhibit the amount of writing done by the students in the word processing group.

At the end of this study, students in both groups were given an inventory which measured attitudes about writing. This
instrument was a fifteen item Likert type scale questionnaire which attempted to measure how students felt about their writing abilities. The same instrument was used for both the word processing group and for the nonword processing group. When the results of the attitude inventory were analyzed, significant differences were found between the two groups. The mean for the attitude score of the word processing group was 52.6 (s.d.=12) while the mean for the general attitude score for the non word processing group was 42.5 (s.d.=8). In general, the word processing group felt more positive about the instruction they had received, more positive about their ability to write, and more positive about editing groups than the non word processing group.

Hennings (1981) suggested that word processors could be an effective tool in the language experience approach (LEA) to the improvement of reading and writing skills. LEA is an attempt to bring oral and written language together in the instructional program. It is based on the philosophy that children can learn to write and read their oral language more easily than they can learn to write and read material which is less relevant to them (Hennings, 1981).

In a study conducted by Bradley (1982) three groups of five or six first graders were selected by their teacher to participate
in a language experience lesson in which the researcher typed the children’s stories into the computer. This was in contrast with the traditional LEA method in which the teacher prints dictated sentences on a chart. All of the children were of average or above average ability, and except for two children whose families owned microcomputers, had had no previous experience using microcomputers. All of them had participated in writing language experience stories before. The children were seated in a semi-circle in front of the visual display unit. The teacher sat at the keyboard which was perpendicular to the visual display unit. This arrangement permitted the children and the teacher an unobstructed view of the screen and allowed the children and the teacher to converse easily.

Some time was spent in introducing the microcomputer to the children, explaining how it works, and demonstrating some of its capabilities such as adding and subtracting numbers, and displaying the children’s names on the screen. The children were told that by inserting a disk into the microcomputer they could write a story and the computer would help them to make changes and corrections in the story if they wished. As a demonstration, the teacher typed several practice sentences and made some changes in them. Each of the groups then composed a collective story about a large stuffed rabbit which had been brought in as a stimulus.
Several advantages in using the microcomputer for writing language experience stories were noted. Children seemed highly motivated by seeing their spoken language appear on the screen and were eager to contribute ideas and to read the sentences as they were displayed. Each of the groups asked if they could write another story at the conclusion of the lesson, and many children commented that the experience was "really fun." Other advantages were the speed at which the children's dictation could be transcribed. Each of the stories was longer than the usual LEA story, which is probably another result of the speed and ease with which dictation can be typed into the microcomputer. Another factor may be the physical limitations of the chart paper as opposed to the greater capacity of the visual display unit. In traditional LEA stories when the developing story fills one lined chart, a much slower and laborious process, there is a tendency for both children and teacher to breathe a sigh of relief and write "The End" on the bottom line, whether or not the topic has been dealt with completely. A lined chart has space for approximately forty printed words and it is rare to see an LEA story which uses more than one chart. The shortest story that was written in this study used seventy-six words; the other two used 127 and 118 words respectively, a sizeable difference. The capability of the computer to produce hard copies of the LEA stories for immediate distribution to the members of the group is
a decided advantage over the traditional lesson in which the children must wait until the next day to see the printed version of their writing. Getting the printed copy of the story immediately stimulated great excitement and unprompted rereading by all of the children.

There are several misconceptions about the use of the computer to assist writing programs. One common misconception is that a person must understand complicated mathematical relationships to use a computer (Hennings, 1981). This misconception can easily be unraveled by observing children in a classroom where there is a computer. They tend to be uninhibited and able to play with the machine until they get it to do what they want. No mathematical skills are required to use a computer for word processing.

A second misconception that some teachers have about the new technology is that the use of the computer can mechanize and depersonalize instruction (Hennings 1981). Certainly, a computer does have this potential if misused. There are some programs that are strictly drill based and if this is all a child is exposed to then the accusation holds true. However, when the computer is used as a word processor and especially when it is used as part of teacher-guided writing instruction depersonalization is not a
problem. Actually, the machine-based operation may be more personal because of the greater speed of the process and the elimination of the need to copy and recopy what one has written (Hennings 1981).

A third misconception that some educators hold is that the computer is a device of the distant future. Nothing could be farther from the truth. The computer and microcomputer are all around us and are moving rapidly into our schools. Society is dependent upon the use of the computer and educators have as their responsibility the preparation of students for the world in which they live.

The use of the computer in the classroom appears to offer many advantages for the students who use them. They probably are not a panacea, however if used thoughtfully and wisely they can certainly at the least be an aid to any classroom. As professionals, educators will have to play a major role on establishing guidelines for the use of computers in their classrooms. More specifically, given the goals and objectives of language arts instruction, they will have to determine the curricular suitability of this tool (Zaharias, 1983).

As more and more software programs become available educators
must closely scrutinize as to which program will successfully fulfill his/her students' needs. Educators must also realize that the computer cannot in any way substitute for a teacher. For example, most computer-assisted instruction is transmitted visually through textual presentations (Zaharias, 1983). Consequently, the use of microcomputers in isolation for individualized instruction will not facilitate or enhance students' oral language development. Extensive use of the microcomputer may, in fact, impede such development, as well as children's ability to interpret and produce written language. This is particularly true for students whose background of experience does not include conversations or discussions with linguistically mature adults and for children in the early primary grades where new syntactic structures and new vocabulary are continuously being acquired (Zaharias, 1983). Students of all ages need exposure to a rich language environment if they are to expand and refine their communication skills. They need to interact with teachers and peers, as well as with computers. A balance must be put into place where the learner is exposed to the best possible learning environment while utilizing the best possible mode of transmission.
Chapter III

Design

Purpose

The purpose of this study was to examine the effect of the use of the computer on the quality of second grade students' writing.

Null Hypothesis

There will be no statistically significant mean score difference between the computer group scores and the pencil paper group scores on the holistically scored writing samples of second grade students.

Methodology

Subjects

This study involved twenty-five second grade students from a rural, public elementary school in western New York.
Materials

The writing topics that were used for this study were chosen by the examiner.

Writing samples were scored holistically, using a scoring rubric based on second grade expectations.

Procedures

The study consisted of a collection of two separate writing samples taken from the students. One was done on the computer while the other one was done by pencil and paper.

It was a counterbalance design in that twelve of the students did the first writing sample on the computer, while the other thirteen students did the first writing sample by pencil and paper using the same topic. The second writing sample reversed the order in which the students completed the writing sample on the computer and by pencil and paper using the second topic. In this way interest in topic will not be a determining factor in the quality of the writing samples.

Analysis of Data

The writing samples were scored holistically, with a 0 - 4, by the examiner and a second reader using a scoring rubric. A
third reader was used whenever a discrepancy existed between any of the two scores.

A t test was used to analyze the data.
Chapter IV

Analysis of Data

Purpose

The purpose of this study was to examine the effect of the use of the computer on the quality of second grade students' writing.

Null Hypothesis

There will be no statistically significant mean score difference between the computer group scores and the pencil/paper group scores on the holistically scored writing samples of second grade students.

Analysis of Data

A correlated t test (dependent means) for the difference between the two means was used to compare the mean score of the computer writing samples and the mean score of the paper/pencil writing samples. A calculated t score of .5946 was obtained. Since the critical value of t for 24 degrees of freedom at the 95% confidence value is ±2.064 and since the t obtained was .5946 the null hypothesis is retained.
Table 1

Test of Differences between the Two Mean Scores

<table>
<thead>
<tr>
<th></th>
<th>df</th>
<th>X</th>
<th>s.d.</th>
<th>t</th>
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<td>24</td>
<td>2.24</td>
<td>1.13</td>
<td></td>
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<tr>
<td>Paper/Pencil</td>
<td>24</td>
<td>2.36</td>
<td>1.08</td>
<td>.5946</td>
</tr>
</tbody>
</table>

Crit t = ± 2.064; p < .05

Having determined that there was no statistically significant difference (p<.05) between the mean scores of the computer treatment and the mean scores of the paper/pencil treatments, the null hypothesis is retained. There is no statistically significant mean score difference between the computer group scores and the paper/pencil group scores on the holistically scored writing samples of second grade students.
Chapter V
Conclusions and Implications

Purpose

The purpose of this study was to examine the effect of the use of the computer on the quality of second grade students' writing.

Conclusions

The results of this study do not substantiate much of the research in the area of the computer as a superior method in teaching writing. However, much of the research that has been conducted in this area has primarily dealt with older students whose writing skills are more developed and who have also had more exposure to the use of the computer as a writing tool.

Although, the results do not indicate the computer as a superior method in teaching young children writing, they also do not indicate that it has a negative impact upon their writing achievement. The scores between the two methods of writing were only three points apart with the pencil/paper samples scoring 59 while the computer samples scored 56. Also, there was not a large discrepancy between total number of words between the two modes of writing. The computer samples word length was only 29 words more.
An interesting finding of this study was that even though more words were written on the computer, fourteen of the subjects wrote more on the pencil/paper task, one subject wrote the same amount on both tasks, and ten subjects wrote more on the computer. This finding is in direct opposition to most of the research that has been conducted in this area. The increase in total words from the pencil/paper samples to the computer samples was slightly higher at an increase of 704 words, while the increase in words from the computer samples to the paper/pencil samples was 675 words (See table two).
Table two

Comparison Data on the Two Treatments

<table>
<thead>
<tr>
<th>Subject</th>
<th>Computer Holistic Score</th>
<th># of words</th>
<th>Paper/Pen Holistic Score</th>
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<td>245 +104</td>
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<td>235 +30</td>
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<td>179 +105</td>
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<td>2</td>
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\[ \sum = 56 \quad \bar{X} = 2.24 \quad \sum = 2,474 (+704) \quad \bar{X} = 59 \quad \sum = 2,445 (+675) \quad \bar{X} = 2.3 \]

* increased number of words over other treatment
This research does support the notion from previous research that as total number of words increases the quality of the writing is rated higher. There was a trend noticed in this area from this research. Thirteen of the subjects scores rose as the total number of words increased, nine subjects scores stayed the same as word length increased, one subject's score rose as total number of words stayed the same, and only two subjects scores dropped as words increased. Perhaps there is a direct link between the quality of writing and total number of words. This probably should not be too surprising, as it would seem that with a lengthier manuscript there is more substance from which to judge. However, that is an area that needs further research.

One of the benefits of the computer that the statistical results of this research cannot show is the motivational capacity the computer has for the students. It was observed that the computer subjects were much more excited about their writing activity than that of the paper/pencil group. The computer subjects discussed their stories more willingly with other computer subjects and frequently exchanged ideas with each other. It was also observed that the computer subjects enjoyed reading other computer subjects stories as they were displayed on the screen. This was not observed with the paper/pencil subjects. This finding supports other research that has been conducted in
this area.

Implications for the Classroom

Children need to be exposed to current technology and more importantly, need to be shown how to make the best use of it for their own needs. Classrooms need to be equipped with computers for the students to investigate and to use. Children should be encouraged to use the computer for various activities at an early age. They need to become familiar with the computer through games, language experience stories, writing programs, and so on. There are numerous activities of which the computer is capable for a child of any age. Encouragement for the use of the computer as a writing tool should be adopted by the teachers of today. It should not replace the pencil/paper method for our developing youth, as it does has its purpose. However, the computer must be looked at as an alternative mode in which to express oneself. The motivational capacity that it tends to hold and its fascination appeal should not be overlooked.

The use of the computer for the disabled child or child who has poor handwriting skills can be very beneficial. It may be a bridge that will help this type of individual become an independent writer and also build his/her self esteem.

Students should also be encouraged to share their ideas during the writing process, be it with the computer or with paper/
pencil. This tends to happen more naturally with the use of the computer and appears to make writing more interesting and appealing to the writer. Perhaps if more peer interaction is encouraged during the writing process, the students' interest and quality of writing would increase.

**Implications for Research**

Further investigations into the use of the computer for writing are suggested. Research in the following areas are needed:

1. Does the use of the computer on rough and final copies of writing samples differ significantly as compared to paper/pencil rough and final copies of writing samples?

2. Would an attitude and/or preference survey indicate a significant difference between the use of the computer and a traditional paper/pencil task.

3. Does length of a writing sample have a significant role in the quality of the writing sample?

4. Are there significant differences in the amount of revisions done on computer writing samples as compared to revisions done on paper/pencil writing samples?

5. Are there significant differences in the writing quality of computer assisted writing for the disabled child?

For further study, the following changes in the experimental
design are recommended:

1. A larger sample size of computer writing samples and paper/pencil writing samples.
2. A test to identify subjects who are computer literate should be used for screening purposes.
3. Have the computer writing samples and paper/pencil writing samples conducted in the same environment.

The dawn of the computer age is upon us now. Educators must know how best to utilize this current form of technology to develop and to enhance their students' performance in all areas of academics. The computer does not appear to be the complete solution for achieving higher level performance, however, when used wisely and with a conscientious attitude it can offer another teaching/learning tool to help attain that mean. The computer can offer educators and students alike an alternative method to achieve a desired outcome. The exposure to the use of the computer is in itself worthy of the investment that students and educators will make in this exciting and beneficial form of today's technology.
References


