THE USE OF WORD PROCESSING IN THE WRITING PROCESS OF ELEMENTARY SCHOOL STUDENTS

by

Elaine Alexis Biagioni

B.A., Simon Fraser University, 1974

THESIS SUBMITTED IN PARTIAL FULFULLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF ARTS (EDUCATION)
in the Department
of
Education

SIMON FRASER UNIVERSITY
February, 1985

APPROVAL

Name: Elaine Alexis Biagioni

Degree: Master of Arts (Education)

Title of Thesis: The Use of Word Processing in the Writing Process of Elementary School Students

Examining Committee

Chairperson: P. H. Winne

J. Kendall
Senior Supervisor

A. J. Dawson
Associate Professor

J. Tuinman
Professor
Faculty of Education
Simon Fraser University
External Examiner

Date Approved February 19, 1985

PARTIAL COPYRIGHT LICENSE

I hereby grant to Simon Fraser University the right to lend my thesis, project or extended essay (the title of which is shown below) to users of the Simon Fraser University Library, and to make partial or single copies only for such users or in response to a request from the library of any other university, or other educational institution, on its own behalf or for one of its users. I further agree that permission for multiple copying of this work for scholarly purposes may be granted by me or the Dean of Graduate Studies. It is understood that copying or publication of this work for financial gain shall not be allowed without my written permission.

Title of Thesis/Project/Extended Essay

The Use of Word Processing in the Writing Process of Elementary School Students

Author: _____
(signature)

Elaine A. Biagioni
(name)

April 1/85
(date)

ABSTRACT

This exploratory study examined the effects of editing using word processing, on students' attitudes towards writing, and on the quality of their work. Twelve grade six students participated in an eight week study. The students were randomly assigned to a computer group or a control group, six in each group. It was anticipated that the computer group, because of their use of the editing capabilities of the word processor, would show a more positive attitude and greater improvement in quality of writing than the control group.

Interviews with the students indicated that students who worked with the computers preferred to write that way. The students who did not use the computers wanted a chance to write with them as well. The majority of computer students felt the most valuable and enjoyable part of the study was learning to use the computers. The observations made during the study substantiated a higher motivation level and increased willingness to spend more time writing on the part of the computer group students.

An attitude towards writing scale was administered as a pre and post test. A statistical analysis of the data (ANCOVA) indicated that there was no significant difference between the two groups. However, a t-test to compare differences in pre-test and post-test scores, indicated a significant difference in attitude (positive) in both groups towards writing. This suggests that teaching writing in a workshop environment may have a positive effect on the attitudes of students towards writing.

Three independent markers assigned a holistic score to four assignments completed by each student. It was discovered that students of both groups had varied marks depending on the type of assignment. The hypothesis that the computer group students' scores would be better than those of the control group students was not upheld.

The rough drafts and final copies of all student assignments were qualitatively analyzed to see if patterns of editing attempts were different between the two groups. The categories used were: cosmetic, mechanical, organization, information, holistic (complete rewriting). There was no reliable difference between the two groups. There were however, observable trends in the types of revisions preferred by each of the groups.

ACKNOWLEDGEMENTS

The author wishes to express thanks to the grade six students at John Robson Elementary who so willingly participated in the study, and to their teacher, Colin Hancock, who so cheerfully co-operated in arranging timetables. Appreciation is extended to teachers, Gina Gagné, Kit Slade, and Elaine Willis, who generously donated their time to evaluate the students' papers. A very special thanks is due to fellow graduate student, Doreen Malcolm for her perceptive insights and excellent advice. A particular thanks is also due to Jupian Leung for his patience and statistical advice.

Deep appreciation is expressed to my husband Glen for his unfailing encouragement and support throughout this process.

Table of Contents

	Approval	ii
	Abstract	iii
	Acknowledgements	v
I	PROBLEM AND PURPOSE	1
II	LITERATURE REVIEW	4
	1 The Writing Process.	4
	2 Evaluation of Writing Quality.	10
	3 Word Processing and the Writing Process.	16
	4 Attitudes Toward Writing	22
III	METHOD	27
	1 Subjects and Setting	27
	2 Procedure.	28
	3 The Apparatus.	31
	4 Evaluation	32
IV	FINDINGS AND DISCUSSION.	37
	1 Attitudes	37
	2 Revisions	48
	3 Quality of Work.	61
V	CONCLUSION	63
	1 Summary.	63
	2 Limitations.	64
	3 Recommendations.	66
	APPENDIX I	68
	APPENDIX II.	88
	APPENDIX III	91
	REFERENCES	95

List of Tables

I	Pre and post test scores on the attitude scale, Control group w. Experimental group	42
II	Summary of analysis of covariance of the pre and post test scores for the Attitude Scale for twelve students.	43
III	Pre and post test scores on the attitude scale for twelve subjects.	44
IV	Analysis of variance to compare the revision scores of the Control and Experimental Groups among the four separate assignments.	49
V	Comparison of means for revision scores for each assignment.	50
VI	Comparison of the types of revisions per assignment for the Control group and Experimental Group	51
VII	Interrater reliability	61
VIII	Scores for pre and post test attitude scale for twelve subjects.	87
IX	Tabulated responses to interview questions	90
X	Holistic and revision scores	91

List of Figures

I A scatter-plot of the students' scores in pre and post test attitude scale for all twelve students . 45

II Amount of change for each students in pre and post test attitude scores 47

CHAPTER I
PROBLEM AND PURPOSE

North American society has become computer rich. Parents and educators are becoming anxious to provide students with the necessary experience and ability to cope with a rapidly approaching electronic age. Hence there is a growing movement to acquire computers in elementary schools in the province of British Columbia. A comparison of the 1983 Simon Fraser University Study (Jones, Porter, and Rubis, 1983) to the recent B.C.T.F. Microcomputer In-Service Survey, (Flodin, 1984) shows that in one year there was an increase of over one hundred per cent in the total number of micro computers in the Province (fifty-nine out of ninety-two districts responded to both surveys). The total number of computers in those districts was 2,487 in 1983; by June, 1984, there were 5,295.

This growth of computers in schools requires careful study to determine the best possible methods of combining computers with curriculum. Teachers surveyed (Flodin, 1984) stated that the most vital issue they face regarding computers in education is "...the need to integrate computers into the classroom as a means rather than an end" (p.34). The need for careful investigation of this area provided a motive for this study.

The computer is currently used as a powerful writing tool in many professions where people write for a living. Word processing has become a valuable writing tool for adults. Papert (1980) states, "What is good for professionals is good for children" (p. 30). This theory is taken one step further

by Smith (1982), who maintains that anything that can reduce the effort of writing is likely to improve the quality of writing.

There is increasing concern over the poor quality of writing skills of elementary students in British Columbia. The results of the B. C. Assessment of Writing, indicate that "...students at all levels don't write as well as it was hoped and expected they would." (1978, p. 11). This phenomenon is not unique to British Columbia. Such a sentiment is echoed by many researchers. Mosenthal et al.(1983) states, "In education, there has been a growing concern over a perceived lack of writing abilities in elementary, secondary, and post secondary students" (p. ix).

Current research points out the desirability of teaching writing as a process, a process that includes revision as an important and necessary step in writing (Graves, 1983, Smith, 1982). Scardamalia, et al. (1981) state, "Revision is a major part of the writing process for any skilled writer, but it is frequently done superficially or not done at all by students" (p. 143). Students are reluctant to engage in extensive revision of their work since it is viewed as a tedious procedure (Papert, 1980).

There are three major areas of investigation in the literature review. First, current research in the writing process was investigated to determine the role of revision in the writing process, and whether or not elementary age students can be taught to revise their work in meaningful ways. Second, a considerable problem that was addressed was in determining how "quality" of writing can be measured and whether or not instruction in writing as a process can result in improved "quality" of writing. Third, research of computer

applications in education was examined for evidence of success in teaching elementary students to use computers as tools in writing. Success was measured by the students' attitude towards computers and their motivation to use them in writing.

A school based exploratory study was then designed and implemented to test the feasibility of applying findings from the area of writing as a process with emphasis on the role of revision, and the use of computers in this process in a classroom setting in an elementary class in British Columbia.

CHAPTER II
LITERATURE REVIEW

The literature reviewed in this study will be examined in three sections. The first section looks at current research in the area of writing as a process, with a focus on the role of revision in the total process. The second section examines the ways in which one can define "quality" of writing. The third section examines research available in the area of computers and writing, and the fourth section explores research in measuring student attitudes.

II.1 The Writing Process

Literature on the writing process was examined to establish an enlightened model for the writing class to follow. Particular attention was paid to the role of revision in an attempt to determine the merit of studying revision within the total process.

There appears to be an increase of interest in methods of teaching writing. According to Applebee (1981),

> "The last several years have seen an increased interest in the writing process and in the teaching of writing ... public concern with writing skills has coincided with new insights into the linguistic and psychological processes involved in writing - insights drawn from a range of disciplines using a variety of research techniques" (p. 1).

Applebee cites case study work of Emig (1971), and Graves (1973), experimental work of Bereiter and Scardamelia (in press), ethnographic research (Florio, 1978), and large-scale assessments of students' ability (NAEP, 1975). Applebee predicts that relating research to current practice will not be easy, since very little is actually known about how children write in spite of the general discontent with writing instruction.

There seem to be at least two major models of writing. Grave's (1983) model views writing as a sequential process, beginning with prewriting, drafting, revision, proofreading and publishing. The second model (Smith, 1982, Flower and Hayes, 1980) represents writing as a non-sequential overlapping process, one in which the stages are not distinct and separable. However, revision seems to be an essential component of both models.

Revision is viewed either as a separate activity on completed drafts or as a recursive activity which occurs during the writing process. Revision is distinguished from text generation because it involves comparisons and an attempt to change existing text. Hence, when students revise, they focus on changing words or phrases that they have already written. It is believed that revising is an important part of writing that successful writers engage in. "All effective writers know writing is rewriting. The inexperienced writer feels a revision is a failure ... Rewriting is what you do when you are a writer, for it is an essential part of the writing process" (Murray, 1968, p. 11).

Graves (1983) discovered that when revising writing, students are reluctant to mark their papers in unusual ways. They do not like to circle words or draw arrows or write in

margins. He claims some children are deterred from revising by the issue of aesthetics. Children seem to equate messiness with errors and tend to keep from deliberately marking up their work. He found that amongst children, the most common form of revision is the addition of information. However, before meaningful revision can take place, the child has to come to realize that "information can be manipulated, changed around, and lined out (although still mostly at the line level). Information and words are seen to be malleable, claylike" (p. 157).

Graves (1983) states,

> Excluding information comes even later in a child's development. It is a long time before any writer spontaneously wants to delete information. A child may have heightened information in one part of his writing, yet still not be ready to remove portions that now fade in importance. This association of length with quality can last up through the doctoral dissertation (p. 158).

Graves discusses the developmental factors that affect the order of children's revisions. "Process" refers to everything from the time the writer considers the topic to the final completion of the paper. According to Graves, "...rehearsal, spelling, forming letters, rereading, voicing, selecting information, crossing out, editing, drawing, rehearsing, revising, reorganizing" (p. 250) are separate units which follow each other in logical sequences to create total process. This process is discovered by students through doing it.

Graves outlines the developmental nature of revision skills and gives tips for implementing a writing workshop. He maintains that students' work should reflect risk taking. There should not necessarily be a steady rise in quality. An up and down pattern emerges as students experiment and explore new topics. He maintains that quality of writing often depends more on the topic and the amount of student interest and knowledge of that topic than anything else.

Some researchers feel that writing is not a sequential process involving separate units (Smith, 1982; Flower and Hayes, 1980). Smith suggests that prewriting and rewriting merge together and overlap. Flower and Hayes (1980) claim that to divide writing into independent stages such as pre writing, drafting, revising, etc. is contrary to the nature of writing. They claim that writing really demands integration of all those elements. "Mental operations such as Generating or Editing can be done independently, but within the act of composing they occur in interactive, recursive patterns, not stages" (p. 41). Flower and Hayes hypothesize that one way to improve writing is to improve the planning process that writers engage in as they write.

One firmly established concept is that lower-level considerations such as mechanics interfere with higher-level concerns such as ideas and organization (Scardamalia, Bereiter and Goelman, 1972). They note that third grade children write very slowly and with obvious labour. They infer that handwriting takes considerable attention. This effort takes attention away from other aspects of writing such as content and higher-level planning. They maintain that more mature writers are better able to keep up with their ideas since their handwriting is fluent and automatic. They conclude that a person's composing ability will depend on his or her

coordination in writing as well as knowledge. Students are thus encouraged to pay attention to mechanics after a first draft has been completed.

Little work has been done to investigate the errors that writers make in rough drafts. This is surprising since error analysis is used extensively in the investigation of other language processes. Nystrand (1982) recommends this as a useful area of investigation in learning about the writing process that children experience.

Individual differences in writing styles have been documented. Parker (1983) commented on the inexact and subjective nature of editing. "Some writers do not want their work tampered with; "Make only suggestions", they say. Other writers prefer that their editors rewrite their work in order to bring out their points more clearly" (p. 464). Parker suggests the role of editor includes "...paring down, building up, moving things around, improving grammar, quickening the pace, clarifying confusions, correcting inaccuracies" (p. 465).

Peer editing is recommended as a beneficial process (Parker, 1983; Strickland, 1960). Parker suggests students should attempt to offer each other suggestions on every assignment. Guidelines and suggestions for feedback should be given to the students so they can learn to give each other helpful and positive advise. Strickland also advocates class discussion of writing. "Writing, sharing, evaluation by the class and self-evaluation are closely interwoven" (p. 68). She suggests that students can become good judges of quality "through discussion and comparison of their own stories with those in books"(p. 68).

Gundlach (1982) states that interest in children as writers has begun to increase. "Probably the major cause for this new attention to children's writing has been the widespread publicity about a "writing crisis" in American education". (p. 130, in Nystrand)

> ...we who teach must become intelligent readers of children's written language. We must learn to hear the coherent voices that often speak in fragmented and uncontrolled written forms; we must learn to recognize the merging of several functions in individual compositions; and we must learn to detect evidence of learning-in-progress in the errors and immaturities in children's written texts. We must also become intelligent observers of children as they write; we must learn to intervene when coaching will be helpful and instructive, and learn to stay out of the way at other times, allowing children to control their own writing projects (p. 145).

It is felt that teaching students to revise their work will result in improved quality of writing. However, an important point that Bartlett (1982) makes, is that "Revisions do not always result in better text" (p. 346). In fact, Scardamalia, et al. (1981) showed that there is no reliable difference in quality of original and revised versions of essays produced by elementary and high school students. The inconsistent results can be attributed to the subjective nature of writing and the complexity of establishing measures to evaluate student's writing.

II.2 Evaluation of Writing Quality

One of the problems facing researchers in writing is the wide variety of ideas surrounding the criteria which define "good" writing (Nystrand, 1982). It is difficult for evaluators to agree on scores for writing since their emphasis may differ on "...quality of ideas, organization, style, spelling and mechanics, and expression" (p. 61). Nystrand claims that "a valid and useful assessment of writing must cope with enormous problems entailed by the absence of abiding, lawful account of how writing works" (p. 61).

Until recently, objective or indirect tests of language skills were used to measure students' writing skills (Spandel & Stiggins, 1981). However, the emphasis in writing measurement has shifted towards using writing samples to assess writing ability.

The advantages of direct assessment are "(1) the extent of information provided about examinees' writing proficiency, (2) potentially high fidelity (authenticity) of the exercise and response, (3) the adaptability of exercises to a variety of relevant real world writing circumstances, (4) high face validity, and (5) relatively low test development costs" (Spandel and Stiggins, p. 6). The disadvantages are the high scoring costs and "...potential lack of uniformity among examinees regarding the proficiencies assessed" (p.6).

It is generally understood that any assessment instrument for writing should include one or more writing samples (Humes, 1980). To establish stable and reliable scores, enough samples of student writing must be taken. Spandel and

Stiggins (1981) found one or two samples to be inadequate. Three samples were considered essential. However, more than three did not significantly increase reliability.

In collecting the writing samples, examiners should ensure that students have had sufficient time to think, organize, write, rewrite and revise their work (Spandel and Stiggins, 1981). This is often neglected when students are tested.

The NAEP's 1974 writing assessment included an attempt to assess revision skills (Spandel and Stiggins, 1981). Students were given fifteen minutes to write their first copy with a pencil and thirteen minutes to revise it with a blue pen. "Papers were scored for overall organization (based on the quality of the revision), and were categorized to indicate the kinds of revisions attempted: Cosmetic (improved legibility), mechanical, grammatical, transitional, informational, holistic (complete rewriting), and so on" (p. 21). It was found that many students did not attempt any revision.

Spandel and Stiggins suggest that the students should have been given more time and opportunity to revise. They should have been allowed to write one day, and to revise on a subsequent day. It is also important that students be taught how to revise their work. Marder (1982) states that "Of course, writers must have read enough, be educated enough, to have a mental model of writing that will be effective to others and against which they can test the persuasive powers of what they have written" (p. 7).

In evaluating students' work, researchers point out the difficulty of finding immediate success with traditional measures. Shaughnessy (1977) asks, "...is it not unusual for

people acquiring a skill to get "worse" before they get better and for writers to err more as they venture more?" (p. 119). There are disagreements about the rates at which students can be expected to gain control over writing. The learner has "a private timetable and improves, often, in seeming indifference to outside schedules, lagging behind or lapping over the finishing lines of courses" (p. 276). Shaughnessy suggests that a number of variables influence students' mistakes and misunderstandings and we have very crude instruments with which to measure success.

There is evidence that a student's writing will vary depending on the context of the writing, audience, interest and motivation, mode, and topic (Carlman, 1984). One sample of writing would therefore be misleading. Carlson states that generalizations drawn from group restults may not be relevant to individuals' performances. Comparison of students' papers on different topics may be unfair since performance varies depending on topic. It is therefore difficult to compare students or group them when the topics have been chosen rather than assigned. Giving students a chance to choose their own topic complicates matters since they may choose topics which are more difficult than others. It is impossible to assure that the choices are exactly the same in difficulty.

More than one topic is needed to assess students' ability, yet it is difficult to be sure that the topics are comparable. It is important that examiners ensure that topic choices are alike enough that they can compare one student's writing on one topic to another student's writing on another topic.

It is recommended that independent markers be used to assign scores to papers (Spandel and Stiggins, 1981). Markers should be experienced in teaching language arts, familiar with pertinent terminology, and practiced in rating student papers at the appropriate level. "All papers should be read by at least two raters to minimize the chance of error resulting from rater fatigue, prejudice or other extraneous factors" (p.25). "Scores may be added or averaged across raters to determine the final scores. Disagreements of more than one rating point should be resolved by a third reader or through discussion by the disagreeing raters" (p.25).

There are at least three specific strategies for evaluating writing samples. Holistic scoring is a procedure in which a rater reads the paper quickly for a total impression and assigns a score to the paper. That score can be arrived at by matching it with the sample, or grading for specific features, or assigning a letter or number grade (Conroy and Jeroski, 1980, p.11).

The number of scale points used and the criteria applied can vary. Some scales include as many as ten points and others as few as three or four points. A "match-to-sample" approach has been taken by some researchers and others have provided descriptors for each scale point (Conroy and Jeroski, 1980).

When holistic ratings are used, usually multiple independent readings of the same paper are made and the ratings are added. The Spearman-Brown prophecy formula is used to estimate reliabilities of the scores (Conroy and Jeroski, 1980). Holistic scoring is found to be useful for

program evaluation, but not for providing specific information to teachers since it is difficult to determine why papers received the ratings they did.

Primary trait scoring was developed for the 1974 NAEP Writing Assessment. It uses sub-categories and the paper is evaluated for evidence of the trait that is specified. Primary traits are situation specific. For example, "...a good mystery story will excite and entertain the reader; a good letter of application will get the interview." (Spandel and Stiggins, 1981). Sometimes secondary traits are evaluated as well. "For responses to an exercise where writers were asked to tell what was happening in a picture so that the reader could 'feel' the experience, the primary trait was "entry into the imaginary world of the picture", while secondary traits evaluated were "use of dialogue", "consistency of point of view", "presence of fantasy", "presence of insights", and "appropriateness of tone" (Conroy and Jeroski, 1980). Weaknesses of analytic scoring include the danger of over-emphasizing specific traits while the overall worth is not appreciated, and the high cost factor that increases when the number of traits increases. Primary trait scoring seems appropriate for diagnosing writing problems, measuring student achievement, and evaluating programs.

Analytical scoring identifies one or more characteristics of writing and scores them individually. It is used to measure students' ability to deal with specific conventions of writing such as punctuation, organization, syntax, etc. Traits are explicit so that raters understand and agree on the basis of making judgments. Criteria for judging each trait is decided in advance. Written guidelines are used to assist the raters. Raters should have a chance to participate in

selecting traits and establishing criteria so there is agreement and understanding of the criteria. This helps to ensure high interrater reliability.

Analytical rating is more costly than holistic since it is time consuming. The time required rises in relation to the number of factors one looks at. The advantage is that it provides potential for detailed analysis of students' writing proficiency (Spandel and Stiggins, 1981).

II.3 Word Processing and the Writing Process

Research on the computer as a writing tool is very recent. There is, however, good reason to believe that "word processing may play an important role in the writing process" (Billings, 1983, p. 14).

The physical act of writing is seen by researchers as a major barrier for students in writing fluently and effectively. Watt (1984) claims the computer can reduce the physical strain and hence "usher in a new age of writing instruction".

Papert (1980) states that:

> "My image of myself as a writer includes the expectation of an "unacceptable" first draft that will develop with successive editing into presentable form. But I would not be able to afford this image if I were a third grader. The physical act of writing would be slow and laborious. I would have no secretary. For most children rewriting a text is so laborious that the first draft is the final copy, and the skill of rereading with a critical eye is never acquired. This changes dramatically when children have access to computers capable of manipulating text. The first draft is composed at the keyboard. Corrections are made easily. The current copy is always neat and tidy. I have seen a child move from total rejection of writing to an intense involvement (accompanied by rapid improvement of quality) within a few weeks of beginning to write with a computer" (p. 30).

In an interview, Graves admitted that he was initially suspicious of word processing (Green, 1984). He anticipated that the finished-looking quality of a computer print-out may make students even more reluctant to revise their work than they already are. However, after working with a word processor for a few months, he changed his view and now feels that since there is no penalty for revising it may make it easier for students to play and experiment with their writing. Graves suggests that one of the keys to helping students to improve their writing is to publish their writing frequently and distribute it to others. This is made easy by a printer.

The major advantage of word processors as tools is the speed with which computers process and print out text (Newman, 1984). Although the initial time of typing in the text is not changed, the time involved in changing and reorganizing the text is dramatically speeded up. The importance of this effect is that students can take more risks while writing because it is easier to change it afterwards. The writer can be free about altering word choices.

Graves (1983) speculates that writers with potential may have been so discouraged by poor handwriting that they don't continue even though the content of their work may be good. They have learned to equate messiness with lack of knowledge. The professional looking copy of the printer eliminates this problem.

A case study of students at Mount Royal College (Collier, 1981) included four nursing students from an introductory composition class who were taught to use word processors. The researcher's hypothesis was that the use of computer-based text editors would significantly expand the number and

complexity of editing procedures used by inexperienced writers when revising text. His study focused on ability to add, delete, substitute and reorder text. His conclusion was that use of word processors did increase the number and complexity of revisions, but did not affect the overall quality of the essays.

In a study carried out with English students, Bencivenga (1982) found that there were several major advantages in using the word processor. These included the ability to store and maintain the student's writing on disk, ability to automatically format the margins, make corrections immediately and neatly on the screen, delete and revise work easily, and produce the second draft quickly. He noted that students had an incentive for learning to master the machine and suggested there might be a carry over to computer literacy in other areas as well.

Increased motivation and interest in writing are mentioned in many studies as being the most striking results of using word processing in writing. Engineering students at Drexel University used word processing for technical writing. Students listed motivation and lack of inhibition as the strongest features of using word processing (Arms, 1982). Two exploratory studies were designed to investigate the use of word processors in improving writing skills of elementary school students (Bradley, 1982). The writer observed that children were highly motivated by seeing their stories appear on the screen. The stories were longer and children felt free to edit more than with the traditional methods. A project in two elementary classrooms in Lexington, Mass. was carried out to observe students revising skills using a Commodore 8K Pet microcomputer (DiaGiammarino, 1981). Students received formal instruction and practice time with word processing. The

emphasis was on revision. The researcher observed that students wrote longer stories, followed directions, and paid more attention to details. Increased interest and willingness to write on the part of reluctant writers was witnessed.

The finding that computers encourage students to spend more time writing is important since researchers generally agree that writing ideally involves time and effort which students are often unwilling to invest. Papert (1980) states, "For me, writing means making a rough draft and refining it over a considerable period of time" (p. 30).

Time is a necessary element for students to write. Smith (1982) observed that good writers spend more time reading over their writing while it is being done and afterwards. Two obvious problems involved in current studies are the lack of time for students to write, and the freedom of access to computers. Often machine and time limitations require formal scheduling of writing time for students. Thus, although word processors may have much potential as useful writing tools, Watt (1984) predicts that they will not have a major impact on schools until they are readily available and students can have regular access to them as familiar tools. Before there will be any significant difference, computers must become as "common as pencils" (p.96).

A program named "Quill" has been developed by Bolt, Beranek, and Newman (Watt, 1984). It is not yet commercially available but is currently being field tested in the United States. It has three major components: a program that assists with prewriting, one that is a filing system to enable students to save text by author and title or key words, and a communications system so students can send messages to each other. A three year grant was received from the U.S.

Department Of Education for its development. The developers are committed to the philosophy of the process of writing and have field tested the program in six elementary classrooms during the 1982-83 school year. Currently it is being expanded to about fifty classrooms around the country. Teachers involved in field testing the Quill program have found it to make a difference in the way children write (Watt, 1984). Teachers involved in the study claim the students write more and enjoy writing more.

Kelly (1982) describes an experiment conducted in a Campbell River Junior Secondary School. He notes that fewer students failed to hand in assignments, the interest was held at a higher level than expected, and no behavior problems arose. Individual instruction was easier to organize, and interaction with students was more intense and positive. Feedback from students was positive.

Increased motivation and longer papers are also reported by Kleiman and Humphrey (1982). They surveyed teachers, researchers and children who were using word processors. They claim the advantages of word processing include increased creativity as well as making the physical aspects of writing easier so students are free to develop higher-level planning and content.

Increased motivation was also discovered to be the strongest feature of the word processor by Montgomery (1983) who implemented a project in the Cowichan School District. He found that students wrote longer stories, paid more attention to details, and overcame their reluctance to write. This was especially noted in a student who had very poor hand writing and preferred to have computer print-outs. Students spent more time writing and found it more enjoyable.

There seems to be general agreement that computers make writing easier and increase motivation. However, one important question remains. Does this lead to improved writing? This researcher did not find any studies which demonstrated that use of word processors improved the quality of students' writing. There were many articles that speculated that it would, but these were unsupported by data. Daiute (1981) suggests that research is not yet conclusive.

In her studies with students at Columbia University, Daiute (1981) found that using computers made students less concerned with errors, since it is easy to correct mistakes. The professional looking print added to the students' interest and pride in their work. She maintains that the real problem for some students is getting them to write at all. Word processing has been useful for helping children with motor difficulties. Children can be discouraged from writing because their handwriting is difficult to read. Daiute found one of the most consistent findings was that writers composed longer papers using the computer. She also found that writers did more rewriting and experimenting when they had a computer to work with.

Research has shown that revision is one of the most important elements of writing. Research has also shown that students do not revise very much. Computers appear to have tremendous potential as powerful tools in promoting revision of writing (Cronnell and Humes, 1981).

II.4 Attitudes Towards Writing

Literature dealing with attitudes of students towards subjects was searched to establish, first, that it is possible to change students' attitudes towards school subjects, and second, ways of measuring students' attitudes. The relationship between attitude and skill was seen as an important area for investigation. If students' attitudes towards writing improved, would their skill level increase as a result?

Lemmon (1973) found that "Attitude is one of the most ubiquitous of all the terms used in social science", and yet it is difficult to arrive at one concise definition of "attitude". Summers (1977) cites Allport's definition as the most influential one and found features of it in most definitions of attitude:

> An attitude is a mental and neutral state of readiness, organized through experience, exerting a directive or dynamic influence upon the individual's response to all objects and situations with which it is related (p. 138).

There has been more research on attitudes of students towards reading than towards writing. Reading attitude has been found to be closely related to achievement, yet according to Summers, it is difficult to find well developed scales with which to measure attitudes. Developing valid scales is a complex matter. Common defects in scales are cited as; lacking discernable underlying theoretical construct; confounding

various theoretical constructs; and having no discernable relationship between the treatments applied and the scale used to measure its outcomes (p. 153).

Kennedy and Halinski (1975) responded to the lack of measurement instruments by implementing a two-year study in the area of measuring reading attitudes. They adopted Good's definition of attitude as "The predisposition or tendency to react specifically towards an object, situation, or value; usually accompanied by feelings and emotions; attitudes cannot be directly observed but must be inferred from overt behavior, both verbal and nonverbal" (p.519). In their opinion, attitude precedes interest. They developed a 70 item instrument using questions such as "Reading is difficult for me" and "I read only what I have to". A four point Likert scale was used to respond to the questions. Kennedy and Halinski found that females scored higher than males, students whose last course grade in English was an A had significantly more positive attitudes than students whose last grade was a B, students whose last score was a B scored higher than students with lower grades, and students on accelerated programs scored significantly higher than students on regular and remedial programs.

A relationship between positive attitude and achievement has been established. Research also reveals that attitudes toward reading can be changed by teaching methods. Healy (1963) investigated ways to improve attitudes towards reading of her ten year old students. She found that students who were allowed to choose reading groups and a wide variety of reading materials had more positive attitudes than students who were assigned to static groups and had a limited reading selection. Attitudes towards reading were measured by the use of questionnaires, observation, pupil response to reading

materials, and reactions to assignments involving silent reading. Healy found that her three year study was too short to reveal the long term effects of the attitude change, so she implemented a longitudinal study to continue her investigation.

In her longitudinal study, Healy (1965) found that changing students' attitudes at the grade five level resulted in a significant difference in reading achievement gains and in the number of books read by students in the first semester of junior high school. Healy assessed attitudes by a time-sampling technique, competency in finding information, use of free time, and a questionnaire.

In the area of writing and attitudes, studies have been conducted to examine the relationship between writing apprehension and writing competency (Daly 1975). Daly claims that academic success is often linked to levels of apprehension about writing. His hypothesis was that, "Since high apprehensives tend to avoid situations requiring writing, thus substantially reducing their opportunities for practice and feedback crucial to the successful development of writing skills, they should perform significantly less well on skill-type tests than low apprehensives" (p. 11). Daly used 3,602 undergraduate students in a mandatory basic composition course from a midwestern university as subjects. Writing apprehension was measured by subjects' responses to a 26-item version of Daly and Miller's instrument (Daly and Miller, 1975). Writing competency was measured by a 68-item multiple choice test of writing competency. Daly concluded that students with low apprehension of writing performed significantly better than those with high apprehension on a test of writing skills.

The instrument to measure writing apprehension developed by Daly and Miller (1975) was a 63-item test with a Likert-type scale format. Categories of questions included items that dealt with general anxiety in writing, and apprehension about the evaluation of writing. Questions included the following; "I avoid writing." "I like to write my ideas down." "Writing is a lot of fun." "It's easy for me to write good compositions."

The "Attitude Toward Writing Scale" was developed by Jeroski (1982) to measure the associations between attitude and cognitive ability and to estimate change in attitude toward writing. It was originally developed for use with Grade six to Grade twelve writing students. Data available is from a pre-experimental administration to twenty-six grade eight and nine classes in six schools from two large school districts in British Columbia (n = 563). It is quick to administer (fifteen minutes or less), and is easy to score. The scale consists of twenty four questions about writing. A six point Likert scale is used with the highest scores reflecting positive responses, the lowest, negative responses. Students were asked to assign a letter from A to F depending on whether they strongly agreed or disagreed with statements such as, "writing compositions is one of my favourite activities...". The summing of the scale produced a score between 24 and 144. Hoyt's ANOVA estimates the internal consistency at 0.91 (Jeroski, 1982). However, information available estimates the internal validity as much lower. Scales designed to measure "Satisfaction with the curriculum", "Perception of own improvement", and "Interest in the writing activities", correlated with the posttreatment Attitude Towards Writing scores 0.48, 0.36, and 0.50 respectively (Jeroski, 1982).

Jeroski found that her data did not support the assumption that writing skill is determined by predisposition towards writing tasks. She found that there was a positive association between the two, but not a large one. Many students who performed well on writing assignments did not have especially pos itive attitudes, while students who had positive attitudes often performed poorly. She concluded "...that improving attitude toward writing, and improving writing performance, must be considered as separate -- although related -- instructional goals" (p. 283).

CHAPTER III
METHOD

III.1 Subjects and Setting

The elementary school participating in the study is one of eight public elementary schools in the New Westminister School District. The school enrolls 203 students in grades Kindergarten to seven. The school population is ethnically mixed and represents a diverse group of interests and needs.

Twelve students were chosen from the grade six class. Students receiving special programs were not included in either the experimental or control group. (Special programs within the school consisted of English for New Canadians, Educationally Mentally Handicapped, Learning Disabilities, Learning Assistance, and Gifted and Talented). Students who indicated they were likely to move or transfer to a new school before Christmas were not considered eligible for the study. The classroom teacher and the researcher selected twelve qualifying students from the class list. Their names were then drawn from a box and in this way the students were assigned to either the computer group or the control group.

Instruction took place in the Learning Disabilities Centre. It was a quiet room beside the grade six classroom where the computer equipment was available.

III.2 Procedure

The students in the computer group began lessons a week before the control group. They were instructed in the use of the keyboard with the aid of a program developed by Ainsworth and Baker called Typing Tutor (1980) and then were introduced to a word processor called Apple Writer IIC which was developed by Lutus, (1981). Each student received individual instruction in basic operations such as loading and operating Typing Tutor and Apple Writer IIC.

All twelve students received thirty minutes of instruction in the writing process, three times per week (a total of ninety minutes of instruction per week). These classes took place on Monday, Wednesday and Friday of each week. Students also received ninety minutes per week of writing time which followed the instructional time. The computer group did all of their writing on the word processor while the control group used paper and pens and scissors and tape. In addition to this, all students received individual conference time once a week. The Computer group received their conference time on Tuesday morning and the Control group received theirs on Thursday morning. During conference time each student had an opportunity to meet individually with the researcher to discuss problems and progress (Graves, 1983).

Computer time was scheduled during the lunch hour, and from one o'clock to two o'clock in the afternoons on Monday, Wednesday and Friday. This was so that the instructional lesson preceeded the students' writing time. In this way students knew what their assignment was. Since there were only two machines the computer group students had to have scheduled time so they could all have equal amounts of writing

time with the control group. The students had a choice of times they preferred and seemed pleased with this arrangement. Computer students came and went according to their schedule. They worked independently at the side of the room on the microcomputers during the Control group's writing time or during lunch, depending on when their time was scheduled for. The Control group received an equal amount of time. However, their writing was done with paper and pencil with all students in the group present, since they did not have to share equipment as did the Computer group students.

During writing process instruction, students were introduced to prewriting, first draft, revision, proofreading and final copy (Graves, 1983). The instructional lessons for each group followed the same lesson plan. Students participated in prewriting activities to generate ideas and descriptive language. They then proceeded to a rough draft. The rough draft was evaluated orally with some written comments and questions by the instructor - only positive comments were made about the content and ideas. Students shared their writing with the group which also was to direct comments to the author's content and ideas. Members of the group asked questions and volunteered additional ideas and information that could be incorporated if the writer chose to do so. Students and instructor focused on positive suggestions and the students were free to edit their work as they wished once they had received that information. The rough draft was then revised. Students were encouraged to reorganize their work and incorporate the new ideas given to them in the sharing sessions. When the revisions were completed, students worked with partners on proofreading for mechanical errors. The instructor then proofread the work before the final copy was written.

Some assignment topics were chosen by the instructor, and others were selected by the students. When students were given the choice, it was stressed that they should select topics they truly cared about and either had some experience with or were willing to learn about. Students were encouraged to find ways of focusing on topics so the topic chosen was not too broad or narrow to write about. Prewriting activities included listing sources and vocabulary applicable to chosen topics and brainstorming to generate ideas related to those. Students contributed ideas to each other's topics.

When students progressed to their rough draft, they were told that their ideas and information were the important considerations at that time. Spelling, grammar, and punctuation were not constraints on generating ideas. Proofreading for spelling and grammatical errors was the final stage before the polished copy was written. Students received a chance to read their rough draft to a partner and to the group. The researcher read the rough drafts and noted ideas that were especially original or interesting and underlined good examples of the use of details to show events. Students were encouraged to underline examples in their partners' work that they especially appreciated or enjoyed.

Students then were given an opportunity to make changes in their work. They were encouraged to expand on the ideas that were noted as particularily interesting and to eliminate ideas that did not contribute in a meaningful way to the subject. The logical organization and flow of ideas were stressed. Students in the control group were supplied with scissors and tape and shown how to use these to eliminate much of the recopying by hand. The computer group was shown how to use the editing features of the word processor to reorganize information and to expand on or delete information. Students

received constant feedback during discussion periods from the other students and from the instructor. Students also received instruction in, and examples of how to give specific and positive feedback.

The edited versions of the students' work were shared with the group and students were encouraged to notice where others had made changes, particularily changes that had incorporated others' ideas. The edited copies were then proof read by a writing partner. Students had a chance to circle spelling errors and make suggestions for improvements in grammar and punctuation. It was stressed that this was not the major or critical area of the writing, but was a formality needed to make their work easier for others to read and enjoy. The polished versions of work were displayed on a bulletin board.

Each student was given a file folder to keep final copies of each assignment. The researcher photocopied all final copies of the handwritten assignments and collected the rough drafts and computer printouts at the end of each session. All drafts were kept for later analysis. The students in the computer group received their own diskettes to use during the study, and were allowed to keep them for future use at the end of the study.

III.3 The Apparatus

The equipment used in this study consisted of two Apple microcomputers with one disk drive each. An Epson printer was used to obtain hard copies of the students' work at the end of each session. Typing Tutor (Ainsworth and Baker, 1980), and

The AppleWriter IIC (Lutus, 1981), were used as software, and each student in the computer group had his or her own blank diskette for saving stories on. Students were taught to save their work on the disks and to load and edit their work. Throughout the study, the equipment functioned efficiently. There was no time lost due to break-downs. The only problem encountered was the late arrival of the printer. It was delayed at the Board Office, and didn't arrive until mid-November. Until then the researcher took the students' diskettes to the District Resource Centre at the end of each class to run off hard copies for the students.

The control group was given tape and scissors and a folder to keep copies of their final drafts of their assignments. They were provided with paper, pencils and pens as needed.

III.4 Evaluation

The design of the study incorporated extensive evaluation procedures as follows: an attitude scale which was administered as a pre and post test to individuals in both groups; a holistic score was assigned by three independent markers to four of the students' assignments; a revision score was given to four of the students' assignments; observations of students' writing behaviour and interaction with others were written during the study; an oral interview with each of the students was recorded.

Each student was given an Attitude Toward Writing Scale (Jeroski, 1982)(see Appendix I). The scale was administered to all subjects at the beginning and end of the study. The "Attitude Toward Writing Scale" was chosen because it was developed to measure attitudes of elementary aged children.

The students' writing at all stages was photocopied for later analysis, and the originals were returned to the students. Final copies and all rough drafts of assignments were kept so the researcher could later study the process that each piece of writing went through as it was completed. It is suggested by Graves (1983) that the most effective means of evaluating students' work is to keep writing folders of each student's work and observe the process that each piece of work goes through. This method was followed in the study. The final copy of each of the assignments was later assigned a holistic grade by three outside evaluators.

The evaluators were experienced intermediate teachers (grades four to seven). The researcher met with the raters on two separate days for four hours on each day. On the first day, the raters were each given a marking kit that contained a set of folders and a marking pencil. The first folder contained criteria for assigning grades, and examples of writing from each scale point. These were developed by the Ministry of Education's Assessment of Written Expression, (Conroy, et al., 1978), for the grades four and eight levels. In the other folders were the photocopied samples of each of the students' assignments. The assignments were organized according to topic but were randomly ordered in respect to chronological completion and group assignment.

The researcher went over the criteria for marking with the raters and discussed the scale points and possible interpretations. The markers were instructed to read each paper quickly to form an immediate impression in terms of overall impact. They were not to analyze the papers in detail or assign separate marks for different aspects of the writing. The markers then practiced grading the sample papers, and compared their grades to those suggested by the guidebook. They discussed the reasons they had assigned the grades and discussed the ways in which they felt the samples did or did not match the criteria list.

The markers were given the following marking guide which was taken from the Assessment of Written Expression, 1978, (Conroy, et al. 1978) as a general aide to help focus on the three essential components of successful writing - content, organization, and mechanics.

The following scale with descriptors was used:

Scale Point 1: Very few ideas and these are expressed in confused or fragmentary syntax.

Scale Point 2: Very few ideas; numerous weaknesses but the gist is fairly clear.

Scale Point 3: Very few ideas but greater detail. Poor expression but gist is fairly clear.

Scale Point 4: A greater range of ideas but poorly sequenced; little elaboration; numerous errors.

Scale Point 5: Several ideas in clear sequence. However, ideas not very detailed or interesting.

Scale Point 6: Several ideas in clear sequence with occasional interesting detail; numerous errors.

Scale Point 7: Contains a lot of ideas but the development is confused or unbelievable and there are many errors.

Scale Point 8: Has four or five ideas tied together in a believable sequence but there are frequent errors.

Scale Point 9: Tells a story with several ideas developed in a believable sequence and with very few (or no) errors.

On the second day that the raters and researcher met, the marking criteria was reviewed and the remaining papers were marked.

A revision score of one to five was assigned to each of the four assignments, based on the type of revision that each paper went through from the first to the last draft. A score of one point was given to an assignment that had cosmetic changes only. The highest score of five was given to assignments that were completely rewritten from the original draft.

Observations of student interaction and progress were written by the researcher after each class and at times during the class when the students were writing and after the class. Students' comments about writing were recorded. Observations focused on student receptivity to changes in their edited

versions of their assignments. The observational studies concentrated on the nature and frequency of editing skills used by the students in their writing. These observations are drawn upon only anecdotally; they are not included in the statistical analyses (see Appendix I).

At the end of the study, all twelve students were interviewed individually by the researcher. Questions were based on a questionnaire developed by Jeroski (1982) and were modified to discover what the students had learned, what they valued about the course, and whether they felt use of the microcomputer made a difference to their writing (see Appendix II). Their responses were taped and summarized. The tape is available upon request from the researcher.

CHAPTER IV
FINDINGS AND DISCUSSION

IV.1 Attitudes

Observations of the students were written during the classes. An attempt was made to document relevant comments that reflected the attitudes and progress of the students in each group as they tackled each writing task.

It was noticed that students in the computer group willingly used their full time allotments and asked for additional time to work on their assignments. (This was not given since both groups were limited to equal time). They were reluctant to leave at the end of their allotted time and arguments over the computers took place as students arrived for their time promptly and the students leaving wanted to work longer. The students in the control group finished assignments quickly and individuals asked if they could return to their class early. Additional requests to go the the library and to the washroom came from members of the control group. One student in the control group had difficulty getting started on assignments and two out of the four assignments marked were incomplete.

With the control group there was much discussion during writing; students had to be asked to confine their discussion to topics related to their writing as they tended to get off topic often. The computer group, however, had very little off-topic discussion while writing. They were observed discussing the operation of the micro computer and they were

observed helping each other edit their work. Students in the computer group seemed proud of their knowledge of the word processor and were very willing to show each other new features they discovered. Students working on the computers showed annoyance at the noise level of the control group students' talking. They asked students to be quiet so they could work.

Students in the computer group were willing to spend a longer amount of time on each assignment. The control group students were more inclined to ask what the next assignment was going to be before they had finished the one they were working on. They seemed in a hurry to go on and were reluctant to spend extra time working on their assignments once they had written a second draft. The computer group on the other hand was content to continue adding and changing each assignment. They were required to go on to new assignments since the researcher attempted to keep both groups on a similar schedule, and a collection of at least four assignments by the end of the study was needed to represent each student's work.

When mechanical errors were pointed out to computer group students during the proofreading period, they did not seem discouraged or apathetic about them, but eagerly went about correcting the errors. There was a game-like approach towards proofreading. One student was especially excited to discover that the repeat key made it faster to delete letters. Both groups were encouraged to mark on their rough drafts but the students in the control group did not make many marks. They were concerned with the aesthetics of the page. This was consistent with the findings of Graves (1983). The computer group students did mark up the pages with arrows and circles to indicate additions and deletions.

Interviews with each of the children were recorded and tabulated according to negative or positive responses to the questions. These have been tabulated and are in Appendix II.

All twelve students said they felt their writing skills had improved during the course of the study. One student felt she had "better ideas". Another said she "didn't know much at first, but now I do". One student said she felt the classes helped her know she could be a story writer. One student in the computer group said he can write faster with a keyboard. He knows where all the letters are and can type faster than he can write. He felt this contributed to the improvement in his writing ability.

All twelve students said the assignments helped to improve their writing.

The first, fourth and fifth assignments were most often rated as favorites. These were assignments that the students were allowed to select their own topics. It was mentioned that choosing one's own topic was preferable to writing about something that was assigned.

All twelve students felt that learning to proofread their own papers was a valuable skill and that their ability to do this had improved during the course. Ten out the twelve felt that having other students proofread their work was helpful. They commented that the other students were usually able to spot mistakes they had missed and made useful suggestions.

Ten out of twelve students felt that the prewriting discussions and suggestions for improvement had helped them to generate new ideas and they felt positively about this.

Ten out of twelve felt the researcher's comments, written and oral had helped them to improve their writing.

Most students felt they were able to edit their work, and that it was necessary to do so before printing the final copy. Only one student said she really didn't need to make any changes. Nine students indicated it was a good idea to edit writing, and three students weren't sure if it was or not.

Five out of the six computer students said the most valuable part of the course was learning to use the computers. The sixth student wasn't sure what the most valuable part was. The control group students varied in opinions. One student felt her handwriting had improved. "Learning to write a story", "ideas that people came up with", and, "doing the writing, seeing how successful, how good you really are", were some of the responses of the control group.

One student in the control group rated "Listening to others read their stories" as the least valuable part of the study, another mentioned "drafting" as least valuable since she felt she didn't need to make changes in her stories.

The most enjoyable part of the course for the computer group students was working with the computers. The control group students listed: "writing out the good copy", "talking about the stories", "It was fun", "discussions", "time away from class" and "I liked it all", as the most enjoyable part of the course.

All six of the computer group students said they would do it again if the course was offered. All six said they would prefer to use the computers if given a choice of writing by

hand or computer. Reasons given were, "You can do things by computer", "It's a lot easier to do it with the computers", "I like it more with the computers". Five out of six of the control group students said they would do it again. The sixth said "No, when I write for a long time, my wrist hurts". He said he would come again only if he got to use the computer next time. Five out of the six control group students said they would prefer to try the computer next time. Only one student said it doesn't matter. She would do either.

Seven out of the twelve students felt their attitude had changed towards writing. Comments noted were; "I didn't enjoy writing before class", "Now I like writing more. After I read the stories I started to like them so I did more writing. All the other kids were reading their stories so I did too". One of the computer students noted that he "made lots and lots of mistakes writing on paper - less on computer".

A statistical analysis was performed to see if there was a reliable difference between the scores of the attitude scale for each group. According to those results, the computer group students did not seem to have a reliably more positive attitude towards writing than the control group students. There was no reliable difference found between the pre-test and post-test scores in attitude change between the two groups,

$$t(5) = 1.82, \quad p = 0.128 .$$

Table I summarizes the findings.

Table I

Pre and Post test scores on the Attitude Scale, Control group w. Experimental group.

	Pre-test			Post-test		
	N	Mean	S.D.	N	Mean	S.D
Cont.	6	103.50	13.59	6	116.18	23.90
Exp.	6	99.50	6.95	6	112.83	13.69

The experimental group did not improve in attitude more than the control group. It should, however, be noted that when students were answering the questions on the post-test, computer group students asked if the questions meant writing by hand or with a computer. They were told that it meant writing in general. This might have influenced their responses since all computer group students indicated in the interview that they preferred to write with the computer. The test was not altered to include the variable of using the computer. It can be noted that the standard deviations for the Control Group are large but the means are similar.

An analysis of covariance using the pre-test scores as the co-variate confirmed that there was no reliable difference between the two groups. Table II presents a summary of the analysis of covariance.

Table II

Summary of analysis of covariance of the pre and post test scores for the Attitude Scale for twelve students.

	Sum of Squares	DF	Mean Square	F	Probability
Covariates	1315.06	1	1315.06	4.77	0.06
Main Effects	10.48	1	10.48	0.04	0.85
Explained	1325.54	2	662.77	2.40	0.15
Total	3808.00	11	346.18		

Since the students from both groups were similar in ability, came from the same class and comparable socio-economic situations, they were seen to be quite similar. The two groups were combined, and a t-test to measure differences between the pre-test and post-test score in attitudes was done. It determined that there was a reliable difference between pre-test and post-test scores of all the students together,

$$t(11) = 2.88, \quad p = .015 .$$

Table III summarizes the means and standard deviations for the results of this analysis.

TABLE III

Pre and post test scores on the Attitude Scale for twelve subjects.

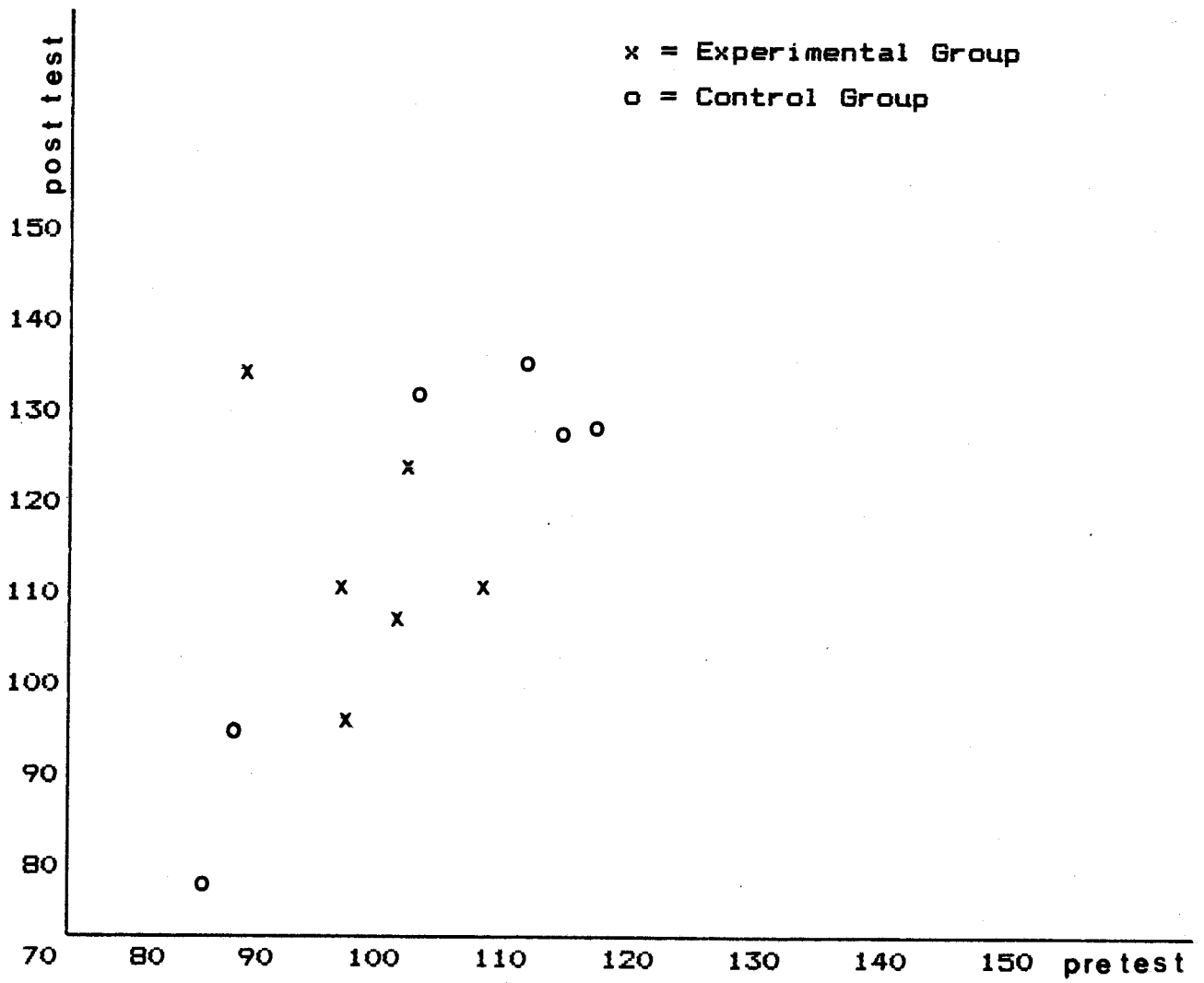
Pre test (K = 12)		Post test (K = 12)	
Mean	S.D	Mean	S.D.
101.500	10.501	114.000	18.606

The training given to improve writing resulted in improved attitude scores of most of the students regardless of whether or not they used computers. This would indicate that teaching writing as a process may be useful since the students have a more positive attitude afterwards. The assumption that computers would cause students to have a reliably improved attitude towards writing is not comfirmed by this data.

Figure I shows the improvement of the attitude scores from pre to post test. All but two students improved.

Figure I

A scatter-plot of the students scores in pre and post test attitude scale for all twelve students.

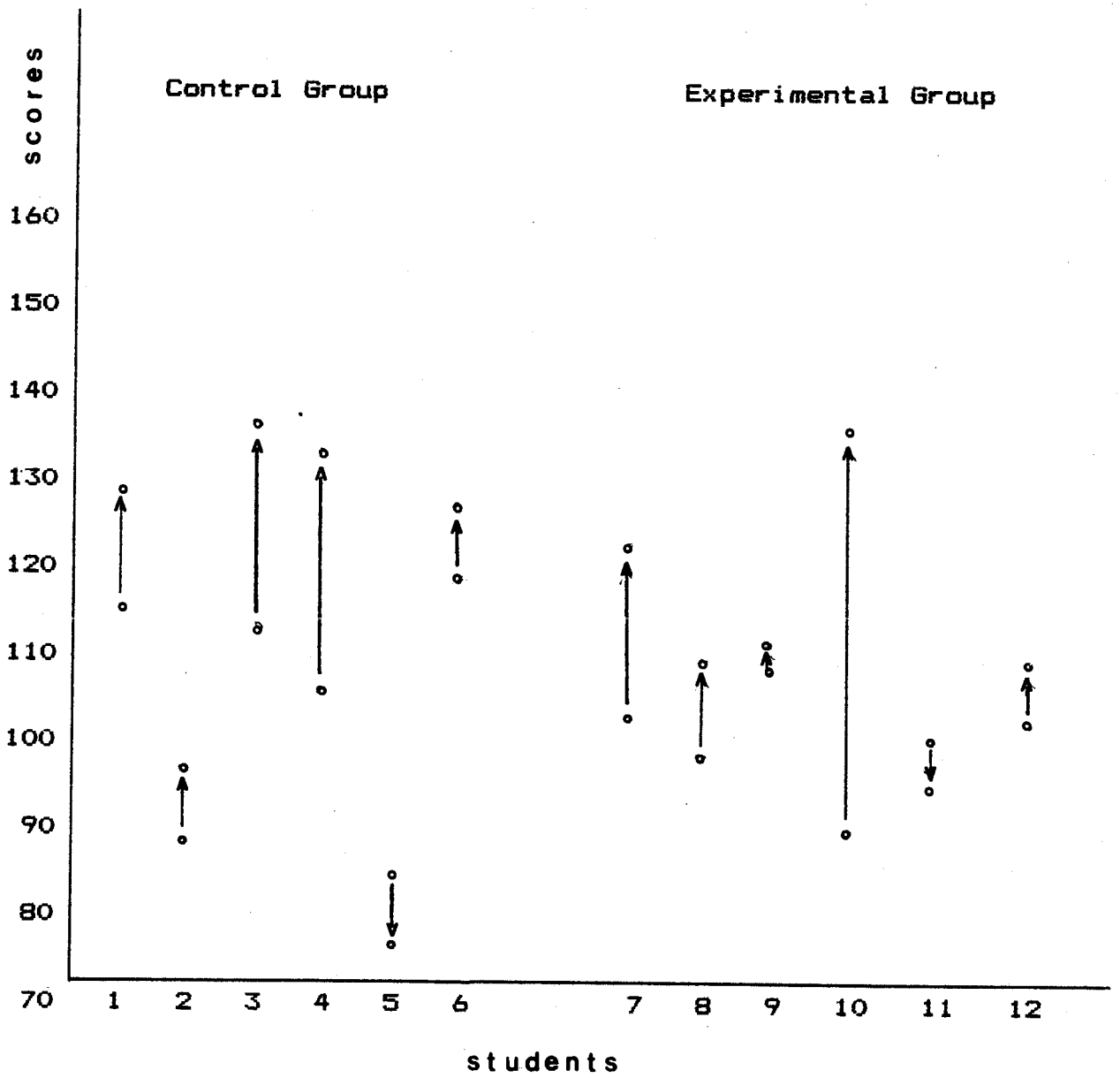


This trend of higher scores in the post test may again suggest that a workshop based writing class may indeed improve attitudes of students towards writing. Since both groups had a reliably more positive attitude towards writing, this indicates there may be value in teaching writing as a process. This does concur with the research of Graves, (1983), and Smith (1982).

Figure II shows the amount of change for each student between the pre and post test scores. Scores are represented for the two separate groups.

Figure II

Amount of change for each student in pre and post test attitude scores.



There was greater variation among the scores for the experimental group than the control group. Student 5C (Control Group) and Student 11E (Experimental Group) both decreased slightly in scores. Only three students out of the twelve were boys and two of those did worse on the post test than the pretest. All the girls improved in post test scores. A large amount of growth occurred in the score of student 10E. Her score went from 88 to 134. This drastic change in attitude was observed in the student's behaviour as well. The student was very enthusiastic about writing with the computers and approached the researcher for a long time after the study with requests for another course.

IV.2 Revisions

Revision scores assigned to final drafts were based on the type of revision that was performed on each assignment. Analysis of variance on separate groups confirmed no reliable difference between the revision scores of the experimental and control group,

$$F(1,10) = 1.838, \quad p = .205 .$$

When the groups were combined and the revision scores were analyzed for differences between assignments, there was found to be a reliable difference between the revision scores for the separate assignments for the combined groups. Data analysis indicated a reliable difference between the revision scores for the four separate assignments,

$$F(3,30) = 6.529, \ p = .002$$ (see Table IV).

Table IV

Analysis of Variance to compare the revision scores of the Control and Experimental Groups among the four separate assignments

Between-Subject Factors Are:
A - Group: 1,2
Within-Subject Factors Are:
B - Task: 1,2,3,4

	Sum of Squares	DF	Mean Squares	F	Probability
A	2.083	1	2.083	1.838	0.205
S-within	11.333	10	1.133		
B	22.417	3	7.472	6.529	0.002
AB	3.750	3	1.250	1.092	0.368
BS-within	34.333	30	1.144		

Table V illustrates the difference between the mean scores for revision.

Table V

Comparison of means for revision scores for each assignment.

	Assign.1	Assign.2	Assign.3	Assign.4
Control	4.000	2.000	2.500	1.833
Exp.	3.833	2.167	2.833	3.167
Combined	3.917	2.083	2.667	2.500

There is almost a two-point difference between the first and second assignments for the combined groups. The second assignment was the descriptive paragraph that was rated the least favorite of the students, and according to Graves (1983), would therefore be the least motivating for students.

Table VI illustrates the number of assignments per group that rated each score.

Table VI

Comparison of the types of revisions per assignment for the Control group and Experimental Group

Revision Score	Control Group	Experimental Group
1 (cosmetic)	4	1
2 (mechanic)	8	11
3 (organization)	8	1
4 (information)	0	9
5 (holistic)	4	2

It is interesting to note the trend that appears between the types of revisions done by each group. The control group preferred to reorganize their papers while the experimental group did not. Eight control group papers were reorganized, using scissors and tape, while only one paper was reorganized by the experimental group. The ease of use of the tools may have influenced this trend, particularly at the beginning when the students were new to the tools. The control group students found using scissors and tape a popular idea, whereas the computer group students were engaged in learning the typing skills needed to use the word processor and were observed using the editing capabilities of the machines only towards the end of the study. It may well be that this trend would change given a longer period of computer use, since use of the editing capabilities is dependent on proficiency.

In the control group, no students chose to add new information, while nine of the computer group students chose to add information to their papers. The computer group students were observed to be more receptive to new ideas and more willing to add suggestions from other students to their writing. The control group students were not as open to others' suggestions and preferred to start over again on a new topic rather than change the old. The computer group students had their stories saved on disk so they could have their rough draft reprinted with new additions or deletions with less extra effort. Four papers were begun over again from the control group, while only two were rewritten from the experimental group. The experimental group did not want to delete all of their writing and begin over again since they had an aesthetically pleasing typed draft and seemed to value it more than the control group valued their handwritten draft.

The students' rough drafts and final copies of assignments were analyzed and their revisions were categorized in the way suggested by the NAEP's 1974 writing assessment (Spandel & Stiggins, 1981). Papers were categorized to show the type of revision attempted. These included cosmetic changes, mechanics, organization, information, and holistic. The assignments are printed as they were handed in.

A score of one to five was assigned to each assignment depending on the most prevalent type of revision that it went through. For example, a revision score of 1 (cosmetic) was given to the following assignment:

> It is winter! snow is falling to the ground in layers. Christmas would be coming soon. The ice is crystal clear. It was spectacular. The trees had

snow covered layers on the rough needles The mountans looked beautiful with snow on them. The snowflakes looked like little white crystals. Just think what fun it wold be, tabboning, sking and all sorts of other stuff. The snow would be perfect for making angels! It's so gorgeous on winter days! Everything seems to twinkle when the snow falls on it. Everything is so pretty with the snow. It's not misty, it's just perfect. I'm glad winter has come!

The revised version of this descriptive paragraph was the following:

Winter in the hills

It is winter! Snow is falling to the ground in layers.

Christmas would be coming soon. The ice is crystal clear!

It was spectacular! The trees had snow covered layers on the rough needles.

The mountans looked beautiful with snow on them! The snowflakes looked like little white crystals. Just think what fun it would be tabbogoning, sking and all sorts of other games!

The snow would be perfect for making angels! It's so gorgeous on winter days! Everything seems to twinkle when the snow falls on it.

Everything is so pretty with the snow. It's not misty, it's just perfect! I'm glad winter has come!

The assignment was written by hand and an effort was made to form the letters more carefully as well as leave spaces between lines. There were a few very minor changes in spelling and choice of words, however, the most noticeable difference was in the cosmetic appearance.

Assignments which were edited to show significant changes in grammar and punctuation were given a score of 2. The following assignment is an example:

Lewis

Lewis and his mom and sister,were going shopping. They were walking down the sidewalk and then suddly,Lewis's boots went thum,thum,thum. And Lewis said mom my boot bluckles are unbluked and then his mom bunt down and bluked them up. They were waiting for the bus stop by the store called Bridgeview Store. they were waiting for a half an hour. The bus finaly came. Lewis and his mom and sister sat in the front of the bus. "Lewis" his mom said, where are your gloves. Mom i had them on when I was at the bus stop. His mom was looking all around and then she saw the gloves underneth the seat. She said to kept them on all times. They past many bus stops in Surrey and then my mom pulled the string and the bus stopped. We got out of the bus and we went to the ice cream shop. "Mom,Lewis said my jacket is unzipped and she pretty soon your whole boby will fall apart and then Lewis's mom bent down and zipped it up. They walked home and when

they got home Lewis mom said, take off your boots,mittens,and your jacket. But mom i could't take off your mittens first o.k. mom and he did and it worked and they had some pie Lewis had five pieces.

The revised version was as follows;

Lewis

Lewis and his mom and sister were going shopping. They were walking down the sidewalk and then suddenly, Lewis's boots went thump,thump,thump. And Lewis said, "Mom, my boot bluckles are unbuckled." His mom bent down and buckled them up. They were waiting for the bus by the store called Bridgeview Store. They were waiting for a half an hour. The bus finally came. Lewis and his mom and sister sat in the front of the bus. "Lewis" his mom said, "Where are your gloves?" "Mom, I had them on when I was at the bus stop." His mom was looking all around and then she saw the gloves underneath the seat. She said to keep them on all times. They passed many bus stops in Surrey and then his mom pulled the string and the bus stopped. They got out of the bus and went to the ice cream shop. "Mom, Lewis said "My jacket is unzipped." And she said "Pretty soon your whole body will fall apart". And then Lewis's mom bent down and zipped his jacket up. They walked home and when they got home, Lewis mom said, "Take off your boots,mittens,and your jacket". "But mom I can't take off my mittens." His mom and

sister pulled and pulled and finally the mittens came off. They had some pie. Lewis had five peices and three glasses of milk.

This assignment was typed by a computer group student. It is difficult to tell if some of the original spelling errors were typing errors or phonics errors, however obvious mistakes in grammar and use of person were corrected in the later version. The student recognized some errors herself and others were pointed out by her partner or by the instructor.

An assignment that was given a score of 3 had information that was in some way reorganized so the logical flow of ideas was enhanced. The following assignment is an example of a paper that showed cosmetic, mechanical and organizational changes. The student was given a 3 since the most noticeable change was in the reorganization.

Trampoline

When you're a starter you shoud learn your flips by a profeshanel first or you might hurt yourself. And you should be taught first if not you could break a bone and it could be very serious. A coach should use a belt to teach not just tell you to do it. You should always point your toes even in a compition.

If taught by two coaches you may get mixed up. You should join for compition not just for fun. You should know how to set up a trampolim before you set one up. It is good exsersize. It builds up a lot of musle.

Double minne

Is a small like Trampoline and you run up and jump on it and do flips. It feels good to jump and do flips some times it is scary, and some times it is not. I like it a lot.

It has to parts that you jump on and it folds in half. It has two wheels on it when you fold it up you put the wheels in it and put it in the place were it is stored.

The student was from the control group. The final copy was neater in appearance and illustrations were included to help describe the trampoline. The revised version showed corrected spelling and mechanics; however, the most interesting thing was seen to be that information had been rearranged to enhance readability.

Trampoline

"When you're a starter, you shoud learn your flips by a professional first or you might hurt yourself. You should be taught first. If not you could break a bone. It could be very serious A coach should use a belt to teach not just tell you to do. He jumps with you and hold the belt and makes it so you don't go flying. You should always point your toes even in a compition.

If taught by two coaches you may get mixed up. You should join for compition not just for fun. You should know how to set up a trampolin before you set

one up. It is good exsersize. It builds up a lot of muscle. It feels good to jump and do flips. Some times it is scary and sometimes its not.

Double minne

Double minne is a small like Trampoline. You run up and jump on it and do flips. It has two parts that you jump on and it folds in half. It has two wheels on it. When you fold it up you put the wheels in it and put it in the place were it is stored.

It was noted that in the final copy there were mistakes that did not appear in the original copy. This happened with the control group students who had to recopy their work by hand.

Assignments that had information added to the original draft after the original draft was seen as complete, were given a score of 4. The following was written by a student in the computer group. The original was very short and the student spent some time thinking about the ways she could add new information.

the stange silvery white hillside is beautiful with green moonbeams. the dark shadowy mountains cast long shadows over the canyon. there are strange animals lurking everywhere the tall trees cast weird shadows on the rocky horizon there are big scary shadows.

The revised paper was as follows:

The Snowy Hillside

The stange silvery white hillside is beautiful with green moonbeams. The dark shadowy mountains cast long shadows over the canyon. There are strange animals lurking everywhere the tall trees cast weird shadows on the rocky horizon there are big scary shadows. The night is dark and scary. The silvery-snow covered house welcomes people warmly. There are mysterious tracks in the snow.The mountains make the ground look freaky.The sky is beautiful with the green moonbeams.

The revised version shows a bit more thought. The information is added to the end of the copy. This was the second assignment, and most students wrote a very short paragraph. This student did not know how to make capital letters on the word processor in the rough draft.

Assignments that were given a score of 5 were deemed to be rewritten with a new focus. This happened when students began writing and found they were dissatisfied with their results or found that they did not have enough information to carry on with a topic. The following is an example of a paper that was given a revision score of 5.

My Honda

On the bike there are big steel parts on the bike like the motor. The honda is really hevay to move. When you see it you probable will think you won't be able to ride it but it's really easy after you learn how to ride it. If you are under eight you can not ride it because it's against the law.

You can't ride it on the road because it's against the law to. But you can ride it on a field any ways that's a lot better for the tiers. You can ride them down at a dump if your aloud or down by the river were it's mudy so you should were boots but you are apost to were them even if you aren't riding in mud. Also you are apost to were gloves to because you can get arthritus.

The student decided to change her topic slightly and write a story about a Honda. The following is the final copy;

My Missing Honda

One Saturday morning I got up and got dressed. I decided to go out and go for a spin on my honda. So I went to the garage and saw that my honda wasn't anywhere. So I ran into the house and called the police. And I told them that my honda went missing at 9:30 a.m. this morning. And they asked if I had a picture of it, and I said I did. So then I went to the police with my picture. And they said they would get a search party right away. So two weeks later they finally found it. And they gave me a call and said that they had found it in a ditch with all the tires missing. Then they asked how much they were and I said that they were six hundred each. He said "good-bye" and then I hung up the phone. And then I looked at the clock to see what time it was and it was 8:00, so I went to bed. Then at 7:00, I got up to check the mail and I found a check for twenty thousand from the police for the tires. And I wrote them a thank-you card.

IV.3 Quality of Work

The independent markers assigned holistic scores for each of the assignments. A Pearson Correlation Analysis was done to determine the interrater reliability. This was found to be very low in some cases.

TABLE VII

Interrater Reliability

	Assign. 1	Assign. 2	Assign. 3	Assign. 4
R1,R2	0.12	0.74	0.23	0.62
	p = 0.36	p = 0.00	p = 0.23	p = 0.02
R1,R3	0.06	0.65	0.04	0.34
	p = 0.43	p = 0.01	p = 0.45	p = 0.14
R2,R3	0.43	0.55	0.56	0.53
	p = 0.08	p = 0.03	p = 0.03	p = 0.04

In view of the poor interrater reliability, the combined holistic scores should be viewed cautiously. The research has established the difficulty of determining criteria that is agreeable to everyone in the area of evaluation of writing (Burrows, 1960).

An analysis of variance showed no reliable difference between groups. The quality of writing was not given reliably higher scores for either group. The holistic grades showed a varied growth in individual student performances. This is

consistent with the research of Graves (1983) and Shaunessy (1977) who discovered that as students explore with language and develop their writing skills, their progress will have ups and downs.

CHAPTER V
CONCLUSION

V.1 Summary

Major findings of the study are:

i. Daily observations indicate a marked difference in enthusiasm for writing between the two groups. The students using computers were more enthusiastic about writing.

ii. Interviews at the end of the study indicate a definite preference for using the computer in writing.

iii. Statistically there was no reliable difference between the attitude scores of the two groups. However, both groups showed a statistically reliable improvement in attitude towards writing at the end of the study.

iv. Holistic grades given by independent markers to each of the assignments show varied growth patterns between individual students. There is no evidence of one group performing better than the other in the holistic evaluations.

v. There is an observable trend in the type of revision performed most by each group. There does not however seem to be a direct correlation between the number of revisions and the quality of the writing.

V.2 Limitations

The subjects were chosen from one class in one school since the researcher was limited in time and access to computer equipment. The school that was used was an innercity school with a diverse cultural population. It would therefore be difficult to generalize the results of these findings to all grade six students in the Province. The results may, however, as an exploratory study, provide the basis for more extensive research using a wider population sample. The small number of subjects limits the power of the statistical tests, so the results of the statistical analysis must be viewed cautiously.

The study was interrupted for one week in November due to a teachers' strike. This may have disrupted the study since the students missed a week of instruction and writing practice. When classes resumed, however, the study went ahead as usual.

The study was short and the long term effects of using microcomputers as a tool may not have been fully assessed since the students were becoming truly proficient with the typing and editing skills needed only towards the end of the study. It was noted that the students' assignments were becoming longer for the computer group towards the end of the

study and their enthusiasm for the study was maintained throughout. In fact, after the study was over, the students from the computer group approached the researcher regularily to ask if they could continue to come to use the computer to write with. The study was too short to determine whether or not the enthusiasm of the computer group would be maintained over a long period of time or whether it would, as a novelty wear off.

The printer did not arrive at school until the study was well under way. The researcher took the students' disks to the District Resource Center to print the copies of the first assignments for the students. When the printer arrived at school there was a noticeable increase of interest and motivation in the computer group. If the printer had been available from the start of the study, the results may have shown different patterns.

In the evaluation it was noted by the markers that the criteria scale was difficult to apply to some of the assignments since they did not seem to meet the stated descriptors of the scale. It was noted that the markers uniformly gave higher grades to the writing as the marking progressed. The papers had been randomly mixed to avoid a chronological inflation of grades. However, the papers that were marked first had the overall lowest grades and the papers marked last had the highest grades. The interrater reliability was very low.

It was difficult to find a scale that accurately assessed student attitudes towards writing. The researcher used a scale that was available and easy to administer. However, the internal validity was somewhat low.

There is a possibility that the special attention that the students received may have resulted in a Hawthorne effect for both groups. The extra instruction in a small group setting may have made the students feel special and hence they may have been more positive towards writing.

V.3 Recommendations

Further research is warranted in this area. Longer studies would be informative since the computer group students were becoming proficient with the keyboarding and editing capabilities of the machines at the end of the study. As the students became more proficient at using the word processor, the length of their assignments was beginning to increase and their interest in writing was higher. There may well be a dramatic change in a study that takes place over a two year period. Larger samples that are randomly chosen would yield results that are more applicable to the province as a whole.

In a future study, students should have more flexible time to do their writing and the students could perhaps be given the extra time they ask for to use the computers to write with. This may affect the comparison of the two groups in an interesting way since the extra time may or may not affect the overall quality of writing. It would be helpful if students were familiar with the features of the word processor before the study begins so they are not encumbered with learning to use the tool at the same time as the writing process.

More suitable software could also be used. The Bank Street Writer gives writers prompts which may be useful to students. Add-ons for the Bank Street Writer have been

developed now. These add-ons allow writers to access specific lessons to generate ideas, organize writing and rewrite drafts (Watt, 1984). The Writer's Workbench is also available now, and although it is very expensive, it has more than twenty-five programs that proofread and analyze writer's text (Watt, 1984).

A study of the attitude differences between genders would be an interesting area to explore. There was a noticable difference in focus between the male and female students. The male students seemed more interested in the actual equipment and often asked if they could program or play games instead of write. In the results of the attitude scale, it was noted that the two students whose attitudes did not improve were both boys. One was from the experimental group and one was from the control group. The student who had the greatest gain in attitude score was a female from the computer group. Jeroski (1982) found that the strongest predictor of attitude towards writing was sex. Female students tended to have more positive attitudes towards writing than boys. It has also been noted by researchers in writing that female students' scores on direct tests of writing are higher than males' scores (Carlman, 1984). Use of computers for writing may change this since boys show an active interest in the machines and this interest may have a carry-over effect on their attitude towards writing if the machines are applied to writing.

Students in the computer group were observed to be more inclined to concentrate on their work. They were not as easily distracted as the students in the control group. Research to study the implications of this in terms of students developing concentration skills and improved on-task work behavior may yield interesting results.

APPENDIX I

OBSERVATIONS

Oct. 12

Twelve grade six students were introduced to the study. Formal consent slips had been sent home and returned signed. Parents were contacted by telephone as well to be sure they were informed of the nature and extent of their child's involvement in the study. Students were informed of the time required out of class and of their commitment to remain in the study until the Christmas holidays. They all agreed they would like to be a part of the study.

An attitude towards writing scale was given to all twelve students in the study. Immediately after the pre test, students wrote their names on slips of paper and names were drawn from a box. It was agreed that the six students whose names were drawn would use the micro computers to write their assignments. The remaining six students would write by hand.

Oct. 13

The Computer Group met at 11:30 to receive an introduction to the Apple key board and the Typing Tutor program. Students were enthusiastic and came on time for their individual practice time.

Oct. 14

The Computer Group met at 11:30 to review the keyboard and the Typing Tutor and to be introduced to the Apple Writer IIc. Students arrived on time for their thirty minutes each to practice.

Oct. 17

The Computer Group met at 11:30 to have a lesson on the writing process. The concept of pre writing was discussed. We listed prewriting activities. Suggestions were: think about subjects, read about them, watch films, listen to tapes, look at pictures, brainstorm, go on fieldtrips, vacations, observe, write journals. We brainstormed for topics that the students thought they would be interested in writing about. Students suggested the following: animals, computers, people, pollution, cars, seasons, models, diabetes, earth, sea, ocean, U.F.O.s, brains, Big Foot, space, dreams, energy, singers, planets, plants, chlorphyll, medical problems, food, hobbies, life cycle, opera, disks, machines, video games, jobs, software, mime, bombs, war.

Students were assigned to select a topic and make a list of things (min. 10) related to the subject they chose. Assignments would be written on the Apple. Students had an extra day to practice Typing Tutor. Students typed lists on Tuesday. Would have liked more time.

The Control Group met to complete the same exercise as the other group. Pre writing ideas they suggested were; Thinking about the subject, looking at pictures, reading

books, talking, brainstorming, watching films, T.V., plays, etc., asking or interview people, listen to tapes, records, go on fieldtrips

Topics suggested as interesting included; ocean or sea, people, treasures, animals, buildings, computers, places, plants, bikes, pictures, trpewriters, pumpkins, ghosts, Halloween, trampolines, Christmas, food, vehicles, monsters, clothing, toys, faces, goblins, books, numbers, machines, factories, weirdos, names, equipment.

Students finished lists in 10 minutes. They wanted to go back to classroom. They were afraid they might be missing something. We read the lists out loud and people made suggestions of things to add.

The Computer Group discussed the importance of "focus" and the need to narrow their list down to one or a few aspects about the topics they chose. They were instructed to discuss their topic with a partner to help arrive at something that was genuinely of interest to them. Discussion was very quiet and limited. "This is fun." was often repeated.

The Control Group Discussed the importance of "focus". Students discussed topics with partners. Several students were keen to interview people for information. They wanted to put together booklets and illustrate them. Two students worked together to make up questions to ask the school trampoline coach, so they could report on the sport of trampolines. Two other students wanted to interview the owner of a local candy factory. There was a lot of discussion while writing. One student had difficulty putting anything on paper. He asked to go to the library and to washroom. He then walked around the room waiting for the class to end.

Oct. 18

The first two students came promptly for their computer time. They needed help loading the Apple Writer][and their own diskettes. They needed a little help getting started but were typing with all fingers on the keyboard. They caught onto correcting errors quickly. They were finished their assignments by the end of the thirty minutes. Little discussion took place. The next two students came on time and remembered how to load and edit their work independently. They worked without discussion. They appeared to be totally absorbed by their work.

Oct. 21

Computer group students are making an effort to correct punctuation and spelling, but not many changes are taking place in content. Students don't have much information about their topics - they seem to be winging it. There is a definite need to find out about their topics. It is especially noticable amongst students who have chosen to do reports about animals. They are making up "facts" about lions and monkeys. There are noticeable problems with punctuation. One problem is that the students aren't comfortable yet with the escape key for making capital letters.

Control group students chose topics they were familiar with. Kelly narrowed his topic from "food" to "pizzas". He found he did not know enough and could not find out enough about his subject, to continue with a report as planned so he took Tamarra's advice and changed it to a story about a run-away pizza. This group's stories are longer and the punctuation is much better.

Students in the Computer Group wanted to write on their rough drafts. They were encouraged to circle, underline, add to, and generally mark up their hard copies. It was emphasized that these were "rough drafts" and it was acceptable to mark them up. The discussion at the computers is related to the use of the machines rather than content of stories. Students do not seem to be reading to each other from the screen, they wait until they get the hard copies to share their work.

Oct. 24

The Computer Group is not tired of topics. They are still wanting to add to and change their drafts. They are finding more information about their topics. Stories are growing. Every draft shows signs of improvement.

Shelly wanted a faster way to move the cursor to the end of the file. She never noticed the [E] key when I discussed it earlier. She was excited about it when she discovered it. There seems to be a time when students are ready to accept a new command. They work without the short cuts until they are ready to appreciate the time saved by them.

Shelly and Roxanne work together. Roxanne understood immediately how to use the escape key to capitalize letters. She capitalizes consistently. Shelly has not caught on to capitalizing letters at the beginning of sentences. It has been pointed out to her several times. She continues to not capitalize and is not bothered by the lack of capitals.

Shelly keeps saying "That's fun." When asked what she likes about writing on the computer, she replies, "Well, the other kids have to erase and write things over, but we just move the cursor and do it. And we can use the repeat key to make it faster.

Oct. 24

Editing - We went over editing. I gave Control group students scissors. At the beginning of the class, students were reluctant to read stories out loud. They discussed the main points. Students had suggestions for each other. At the end of the class, two students, Becky and Angel were eager to read stories. They read them with delight. Becky was pleased with her story - she changed it completely - back to Candyland - away from the conflict of her earlier story. Kelly didn't want to leave until he was finished. (First class he sat and watched the clock for most of the time.) There is no sign of boredom with the topics, in fact, there is more interest in them now.

Oct. 28

Control group students have new partners. Tamara is a good proofreader. She and Angel read Angel's story together out loud, stopping to add commas and punctuation. Kelly had to be urged to read his story out loud to Nicole. As he read it, he stopped to correct it. He seemed to enjoy reading it. Students read each other's stories and seemed to enjoy reading each other's work. Students seemed engrossed in copying stories for their final copies, but I overheard someone saying, "This is boring". Control Group students wanted me to choose new partners for them.

Oct. 31

Computer group students have difficulty seeing proofreading errors and difficulty correcting errors on the screen. They need help moving the cursor and getting spaces in the right places. Jennie is absent. Tammy missed her computer time due to a Halloween party. "Computer group" students would like more time to work on assignments. John and Scott came faithfully for their computer time.

Control group students, Kelly and Becky finished early. They were bored and sat and stared at the walls for awhile. They went over to the computers and watched and interrupted. They were asked to move away. John and Scott worked on computers - asked others to be quiet so they could work - too noisy in here.

Nov.2

Computer group students noticed things they would like to improve on. Happy to read final copies out loud. Things they liked - specific aspects of reports. eg. "I like the part about the monkey's fur", etc.

Control group is not as interested in reading words out loud. There are some negative exchanges between students. Students need to be encouraged to make positive comments about each other's work. They are quick to find fault. We worked on a class list of descriptive words about four pictures - finished quickly and bored when finished. Made list of ten words - wanted to color when finished. Not many original ideas - all copied words from the group chart.

Nov. 4

The computer group looked at four pictures. Two were of winter scenes, two were autumn. They listed descriptive words that were appropriate for each picture. They each wrote on the Apple, ten descriptive words about one picture. They were eager to begin a new assignment. Wanted to write new reports. Some students had already written in class notebooks - chose topics of mammals. There was disappointment that they were having to write on the chosen topic. They wanted to choose their own subjects and proceed with that.

Control group had lists of words. They began rough drafts. There is a lot of talking during writing time. Becky stops frequently to read her work to me. However, she is reluctant to read it to other students. Students are encouraged to share their work with each other and help each other.

Nov. 7

The Computer group read list of words and then read papagraphs out loud. Students guessed accurately what each had written about. Paragraphs are very short - not many ideas. They are quite descriptive. Spent ten minutes talking about The Apple Writer II commands.

The Control Group is editing with scissors and tape. Some students want to start over again rather than cut and paste.

Nov. 14

The Computer group is proof reading. Students read partner's stories and then their own. They were asked to mark on the copies any errors they find. Students are not very good at proof reading each other's work. They miss capitals, periods and obvious errors.

There are some problems still with mechanics of the Apple Writer][. Setting up name and date and title with the justify commands is not mastered yet. Tammy needed help loading her program. John didn't understand the difference between a file name and a story title. This seems a common difficulty.

The Control group discussed the importance of correct spelling and punctuation in the final copy of their work. Students complained that their hands were getting sore from writing the good copy out.

Nov.16

Each student was asked to bring a picture to discuss and write about. (Three forgot.) We discussed the photos and asked questions about each. Students explained each in detail - who was in the picture, when it was taken, what was special about it, etc. In the thirty minutes of writing time that followed the discussion, the students typed conscientiously. They stayed the full time and were reluctant to leave.

The Control group discussed the photos they brought. They were given thirty minutes to write a list of the things related to the topics. They chose a focus and began their rough drafts. After twenty minutes, the students are ready to go. They are not interested in staying extra time.

Nov. 23

The Computer group went over stories and helped each other with endings, and ideas. They commented on language, flow of ideas, sentence structure, logic, etc. The printer has arrived - students are keen on getting print outs, changing them and then getting new print outs. The volume of writing is increasing. The students are using their full computer time. They are reluctant to leave at the end of their scheduled time. They aren't tired of working on the same story. They are not as willing to finish and have one final copy. They seem to enjoy making changes and getting a new copy.

The Control group students are having difficulty relating to each other. Their comments are negative and they are unwilling to listen to each other. They prefer to work on their own stories. Not interested in sharing their work. They finish assignments quickly and do the minimum required. Only one student is still enthusiastic. Students are asking if they can finish tomorrow -"my hand hurts". This is a common complaint.

Nov. 25

The Computer group proofread their stories. There were many errors. Spelling and punctuation are problem areas. They are not ready to start on a new topic yet. They are are content to keep working on the same topics. I can see it is difficult to keep the two groups at the same pace. There is a marked difference in the speed at which they work. This could be because of slow typing skills and use of the machines. It

also could be because the students are willing to work longer on their assignments because of the machines. John and Scott are really interested in their work. They are still adding new material to their stories. Shelly has a couple of print outs. Her story was re-organized quite a lot from the original draft.

The Control group is ready to begin a new topic. Students prefer to choose their own topic. Much discussion took place on possible topics. Punk rock was a popular topic. Discussion revealed students had limited information about the subject. Students shifted to new topics when they realized through discussion that they had a lack of information. They are reluctant to research topics. They prefer to find topics they can write about without going to outside sources. Nicole and Angel are in a hurry to finish and start on a good copy.

Nov. 28

Jenny was absent for one week so she is a bit behind. Tammy is showing Jenny how to get started on a new assignment. There is considerable chatting and discussion at the micros. Tammy is very relaxed and comfortable and is proficient in showing Jenny how to set up the justify commands for centering name, date, title. Jenny is typing with one finger of each hand. Typing Tutor hasn't had much carry over for the group as a whole. The students have all lapsed into poor keyboard habits. Perhaps a longer period of time spent with the Typing Tutor would have been appropriate.

The Control group has slowed down considerably. Their final copies have been carelessly done and Angel is rewriting her final copy. There is a lot of off topic chattering as they write. Kelly is a very reluctant writer. He needs

encouragement to discuss his topic. Questions about the topic seem to help him think about where his story is going. He seems to need the chance to talk about his story before he has ideas to write about.

Dec. 2

The Computer group read stories to each other and had a pleasant discussion of their new topics. There are some very original ideas. Not much talking takes place at the machines while the students are typing. Roxanne and Shelly read to each other during typing, but the others didn't.

The Control group read part of Charlotte's web and discussed character development and use of details to describe characters. In their writing time, there is quite a bit of talking. Becky is doing a lot of editing and rewriting of her story. She reads her stories out loud often as she writes. She complains about the physical part of the writing. "I hate writing good copies. You have to do all that work over again." Tamarra complained, "My hand hurts."

Dec. 9

The Computer students are very eager to read their stories out loud to each other. They listen attentively to each other and are generous with encouragement and suggestions of ideas for each other to add to their stories. Their stories are growing. I can see they are incorporating each other's suggestions in their work. Jenny needs help with mechanics of moving the cursor and doing corrections. She seems to have forgotten a lot of the mechanics of the machine during her absence.

Kelly and Nicole worked on pre writing for their new assignment - The Year 2000. They were all assigned this topic. After discussing his ideas, Kelly said, "Oh, now my head is working..." He started to generate ideas. We stressed plot - the importance of a main character, starting with action, and the use of significant details to make their stories more vivid. There were lots of ideas about the story. Travel- jet cars, wagons, horses, mono rails, super fast planes, super cars; Earth - space ships, domes, round glass, solar heated, etc.

Dec. 12

Tammy read her story to the group. Excellent use of details to show an event. The story was very realistic, about a little boy named Lewis who went shopping with his Mom and sister. Students are still wanting to add to their stories. They are not ready to go on to new stories yet. They have lots more ideas. John decided to add a Part II to his story instead of beginning a new one.

Angel read the beginning of her new story, the Year 2000. We discussed ideas for the topic. Students had a hard time getting started. They were concerned about writing exactly two pages. Rough drafts are very rough. Students are skipping lines to get less written. They are reluctant to stay for the whole writing time. The topic doesn't appear to be popular. Angel finished her rough copy quickly. She is reluctant to cut and paste or make any changes. Kelly said, "This is so...much work. My hand hurts."

Dec. 13

The Computer group is excited and anxious to read their stories. They have a lot of good ideas. We went over work individually and organized folders - students listed their work on the inside cover of their folders and ran off good copies on the printer if they didn't already have them in their folders. Jennie noticed corrections that needed to be made in some of her old assignments. She wanted to finish those. They are still enthusiastic about their work. They are reluctant to leave their stories because they keep thinking of new things they want to include to improve their stories. They seem to enjoy finding ways of incorporating ideas that their friends have suggested. Their use of detail is showing great improvement, and their choice of words is growing.

The Computer group is interested in coming back in January to write again. All six students want to be included in a new computer group.

The control group is showing a lack of enthusiasm for their work. There is a lack of motivation for doing their final copies. Lots of complaints and excuses. Suggestions for additions and changes are not welcomed. They are reluctant to make changes. When students proofread each other's work, they listen without stopping the student to make insertions while the person is reading. They are not very attentive or helpful in finding errors. Kelly stared at the wall while Tamara read her story to him. He was supposed to be proofreading for her. The students in this group write only one rough draft, then one good copy. There is no

intermediate writing. They are not using the cut and paste method very much any more. They want a party. All six students want to be in a computer group to write in January.

Dec. 16

Both groups came to class together. They were given the post test Attitude Scale. Students appeared pleased to have their writing folders to take home. The Computer group students seemed excited to have their story disks to keep as well.

The Attitude Toward Writing Scale was used and included with permission of the author, Sharon Jeroski.

Attitude Toward Writing Scale

NAME:_____ DATE:_____

GRADE:_____ SCHOOL:_____

CLASS:_____ TEACHER:_____

INSTRUCTIONS

On the following pages you will find a number of statements about writing compositions. You are to read each statement, and then decide how much you AGREE or DISAGREE. When you have decided, CIRCLE one of the letters on the right using the scale below:

Disagree strongly	Disagree	Disagree a little	Agree a little	Agree	Agree strongly
A	B	C	D	E	F

If you agree strongly with the statement, circle 'F'; if you agree a little with the statement, circle 'D'; if you agree more than a little, but you don't feel strongly about it, circle 'E'. It you disagree strongly with the statement, circle 'A'; if you disagree a little, circle 'C'; if you disagree more than a little, but don't feel strongly about it, circle 'B'.

EXAMPLE: An example is given below. Read the statement carefully, decide first, whether or not you agree, and then how strongly you feel about the statement. Select the letter that best represents your own feeling. Remember, there are no right or wrong answers.

A. Writing compositions is one of my favourite activities . . . . . A B C D E F

C

Sharon F. Jeroski

1980

Disagree strongly	Disagree	Disagree a little	Agree a little	Agree	Agree strongly
A	B	C	D	E	F

1. Writing is a good way to express your feelings and emotions. . . . . A B C D E F

2. It's fun to send letters to your friends . . . . A B C D E F

3. I only write something when I have to . . . . . A B C D E F

4. It would be interesting to have a job that required a lot of writing. . . . . A B C D E F

5. I don't like to write essays or research reports in social studies. . . . . A B C D E F

6. It's more entertaining to read someone else's story than to write one yourself. . . . . A B C D E F

7. Writing compositions is frustrating . . . . . A B C D E F

8. Almost anything is more fun than writing . . . A B C D E F

9. Sometimes, when you're upset, it helps to put your feelings down on paper . . . . . A B C D E F

10. I get a lot of satisfaction from finishing a piece of writing. . . . . A B C D E F

11. Writing a diary or a journal is a waste of time. . . . . A B C D E F

12. I never save anything I have written. . . . . A B C D E F

13. It would be fun to write for a newspaper. . . . A B C D E F

14. I'd rather take a test than write a composition . . . . . A B C D E F

15. The most interesting school assignments are the ones that involve writing . . . . . A B C D E F

16. We should have more time to spend writing in school . . . . . A B C D E F

17. The worst tests are the ones where you have to write paragraph answers. . . . . A B C D E F

18. Composition is the most interesting part of the English courses. . . . . A B C D E F

19. Writing compositions is usually boring. . . . . A B C D E F

20. Keeping a diary is a good thing to do. . . . . A B C D E F

21. Sometimes, it's fun to write something just for yourself, and not show it to anyone . . . . A B C D E F

22. Too much time in school is spent on writing compositions. . . . . A B C D E F

23. There is no pleasure in writing anything. . . . A B C D E F

24. It's fun to read things you have written yourself. . . . . A B C D E F

Table VIII

Scores for Pre and Post Test Attitude Scale For Twelve Subjects

Subject	*Pre test*	*Post test*
1C	114	129
2C	88	95
3C	111	134
4C	104	131
5C	86	76
6C	118	126
7E	103	122
8E	98	110
9E	109	110
10E	88	134
11E	98	94
12E	101	107

*note C = Control group students
E = Experimental group students

APPENDIX II

Interview Questions

1. Have your writing skills improved during this course?

2. Did most of the classes help you in any way?

3. Did the assignments help?

4. What was your favorite assignment?

5. What was your least favorite assignment?

6. Did proofreading other students' work help your own writing skills to improve?

7. When other students proofread your work and discussed it with you, did that help your writing skills?

8. Did the discussions help your writing improve?

9. Did my comments on your writing help you?

10. What was the most valuable part of the course for you?

11. What was the least valuable part of the course for you?

12. What did you enjoy the most?

13. Did your writing improve in:

Use of details to show events?

Use of language to describe ?

Organization of ideas?

Flow of ideas and language?

Sentence structure?

Punctuation?

Spelling?

14. Were you able to edit your work? Did you make any changes before you wrote your final copy?

15. Was it a good idea to edit?

16. Did you find the classes interesting?

17. Was it a good idea to leave the proofreading to the end?

18. Would you like to come to this course again if you had the choice?

19. Would you prefer to use a computer to write with or write by hand?

20. Has your attitude towards writing changed?

21. What is your over-all rating of this course?

Table IX

Tabulated Responses to Interview Questions

		STUDENTS											
		1C	2C	3C	4C	5C	6C	7E	8E	9E	10E	11E	12E
Quest.	1	+	+	+	+	+	+	+	+	+	+	+	+
Quest.	2	+	–	+	+	+	+	+	+	+	+	+	+
Quest.	3	+	+	+	+	+	+	+	+	+	+	+	+
Quest.	4	4	4	5	?	5	3	5	5	1	1	1,4,5	NA
Quest.	5	2	5	NA	NA	NA	5	3	1	5	4	2	NA
Quest.	6	+	+	+	+	+	+	+	+	+	+	+	+
Quest.	7	+	+	+	?	+	+	+	+	+	+	+	+
Quest.	8	+	+	+	+	+	NA	+	+	+	+	+	+
Quest.	9	+	+	+	+	+	+	+	+	+	+	+	+
Quest.	10	hw	?	w	w	w	i	?	c	c	c	c	c
Quest.	11	NA	NA	d	NA	NA	1	NA	NA	NA	?	NA	NA
Quest.	12	w	a	d	f	d	t	c	c	?	c	c	c
Quest.	13	+	+	+	+	+	–	+	+	+	+	+	+
Quest.	14	+	+	+	+	–	+	+	+	+	+	+	+
Quest.	15	+	+	+	NA	NA	+	+	+	+	+	NA	+
Quest.	16	+	+	+	+	–	+	+	+	+	+	+	+
Quest.	17	+	+	+	NA	NA	+	NA	?	NA	NA	+	+
Quest.	18	+	+	+	+	–	+	+	+	+	+	+	+
Quest.	19	?	+	+	+	+	+	+	+	+	+	+	+
Quest.	20	+	+	+	NA	–	+	NA	+	NA	+	+	+
Quest.	21	+	?	+	NA	NA	+	NA	NA	+	+	+	+

+	positive	i	ideas	–	negative
NA	no answer	t	time	?	unsure
hw	handwriting	w	writing	c	computer
d	discussion	f	fun	a	everything

APPENDIX III

Table X

Holistic and Revision Scores

CONTROL GROUP

Student 1c

Assignment	holistic score	revisions
1	18	1
2	24	3
3	20	3
4	27	2

Student 2c

Assignment	holistic score	revisions
1	18	5
2	11	1
3	23	3
4	14	2

Student 3c

Assignment	holistic score	revisions
1	21	5
2	23	2
3	21	3
4	19	3

Student 4c

Assignment	holistic score	revisions
1	21	3
2	10	3
3	12	2
4	19	1

Student 5c

Assignment	holistic score	revisions
1	20	5
2	18	1
3	19	2
4	7	2

Student 6c

Assignment	holistic score	revisions
1	17	5
2	17	2
3	24	2
4	17	3

EXPERIMENTAL GROUP

Student 7e

Assignment	holistic score	revisions
1	10	4
2	8	2
3	19	2
4	18	2

Student 8e

Assignment	holistic score	revisions
1	20	4
2	11	1
3	20	5
4	22	4

Student 9e

Assignment	holistic score	revisions
1	22	5
2	11	2
3	20	2
4	18	4

Student 10e

Assignment	holistic score	revisions
1	22	4
2	25	4
3	24	4
4	18	4

Student 11e

Assignment	holistic score	revisions
1	19	2
2	13	2
3	19	2
4	13	3

Student 12e

Assignment	holistic score	revisions
1	17	4
2	13	2
3	22	2
4	23	2

LIST OF REFERENCES

Ainsworth, D. & Baker, A. Typing tutor. Software developed by Image Producers, Produced by Microsoft Inc., Bellevue, W.A., 1980.

Applebee, A. Writing in the secondary school. Urbana, Illinois: ERIC NCTE., 1981.

Arms, V. The computer kids and composition. Paper presented at the Annual Meeting of the Conference on College Composition and Communication (33rd, San Francisco, Calif., March, 1982. (ERIC Document Reproduction Service No. ED 217 489)

Bartlett, E. Learning to revise: some component processes. In Nystrand (Ed.) What writers know. New York: Academic Press, 1982.

Bencivenga, J. Electronic editing as a tool. English Journal, January 1982, 71, 91-93.

Billings, K. Research on school computing. Computers in Curriculum and Instruction. Grady & Gawronski (Ed.) Association for Supervision and Curriculum Development., 1983.

Bradley, V. Improving students' writing with microcomputers. Language Arts, 1982, 59, 732-743.

Burrows, A., Parker, M., Edmund, N., Deboer, J., Horn, T., Herrick, V., & Strickland, R. Children's writing: research in composition and related skills. Illinois, NCTE, 1960-1961.

Carlman, N. The effects of scoring method, topic, and mode on grade 12 students' writing scores. Unpublished doctoral thesis, Simon Fraser University, 1984.

Collier, R. The influence of computer-based text editors on the revision strategies of inexperienced writers. Paper presented at the Annual Meeting of the Pacific North West Conference on English in the Two Year College, Calgary, Alta., 1981. (ERIC Document Reproduction Service No. ED 211 998).

Conroy, R. & Jeroski, S. General report: British Columbia assessment of written expression. Victoria, B.C. Ministry of Education, Science, and Technology, Learning Assessment Branch, 1980.

Conroy, R., Rodgers, D., Glazier, L., Muir, A., & Noonan, M. Summary Report: British Columbia assessment of written expression. Victoria, B.C. Ministry of Education, Science, and Technology, Learning Assessment Branch, 1978.

Cronnell, B. & Humes, A. Using microcomputers for composition instruction. Paper presented at the Conference on College Composition and Communication. Dallas, March 1981, 1-10. (ERIC Document Reproduction Service No. ED 203872)

Daly, J. Writing apprehension and writing competency. Journal of Educational Research. 1978, 72, 10-14.

Daly, J. & Miller, M. The empirical development of an instrument to measure writing apprehension. Research in the Teaching of English, 1975, 9 242-249.

Daiute, C. Word processing - can it make good writers better? Electronic Learning, March/April 1981, 29-31.

Dawe, A., Watson, W., & Harrison, D. Assessing English skills: writing. Continuing Education Division, Ministry of Education, Victoria, B.C., 1984.

DiaGiammarino, F. Text editing. Classroom Computer News, November/December 1981, 32-33.

Flodin, N. B.C. public schools microcomputer in-service survey. Sponsored by the B.C.T.F. Task Force on Microtechnology in the Schools, 1984.

Flower, L., & Hayes, J. The dynamics of composing: making plans and juggling constraints. In L. Gregg & E. Steinberg (Eds.), Cognitive processes in writing. New Jersey: Lawrence Erlbaum Associates, Inc., 1980.

Graves, D. Writing: teachers and children at work. Exeter, New Hampshire and London: Heinemann Educational Books, 1983.

Green, J. Computers, kids and writing: an interview with Donald Graves. Classroom Computer Learning, March 1984, 21-23.

Gundlach, R. Children as writers: the beginnings of learning to write. In M. Nystrand (Ed.) What writers know. New York: Academic Press., 1982.

Healy, A. Changing children's attitudes toward reading. Elementary English. 1963, 40, 255-257.

Healy, A. Effects of changing children's attitudes toward reading. Elementary English. 1965, 42, 267-272.

Humes A. A method for evaluating writing samples, South West Regional Laboratory (SWRL) No. TN 2-80/02 April 15, 1980.

Jeroski S. Competence in written expression: interactions between instruction and individual differences among junior high school students. Unpublished doctoral dissertation, University of British Columbia, 1982.

Jones, R., Porter, D., & Rubis, R. A survey of the use of microcomputers in B.C. Schools, Simon Fraser Universtity, 1983.

Kelly, K. The essay and the apple writer or how I wrote my first perfect assignment. CUE, May 1982, 20-22.

Kennedy, L. & Halinski, R. Measuring attitudes: an extra dimension. Journal of Reading, 1975, 18, (7), 518-522.

Kleiman, G., Humphrey, M. Word processing in the classroom. Compute! March 1982, 96-99.

Lemon, N. Attitudes and their measurement. New York. Halsted Press, 1973.

Lutus, P. Applewriter IC. Software produced by Apple Computer Inc., Cupertino, California, 1981.

Marder, D. Revision as discovery and the reduction of entropy. In R. Sudol (ED.), Revising new essays for teachers of writing. Urbana, Illinois: ERIC & NCTE, 1982.

Montgomery, J. The application of a microcomputer to the process of writing in an elementary classroom. Unpublished master's project, University of Victoria, 1983.

Mosenthal P., Tamor, L., & Walmsley, S. Research on writing. New York and London: Longman, 1983.

Murray, D. A writer teaches writing. Boston: Houghton Mifflin Co., 1968.

Newman, J. Language learning and computers. Language Arts, 1984, 61, 494-497.

Ney, J. Linguistics, language teaching, and composition in the grades. The Hague: Mouton & Co., 1975.

Nystrand, M. (Ed.) What writers know, the language, process, and structure of written discourse. New York: Academic Press, Inc., 1982

Papert, S. Mindstorms: children, computers, and powerful ideas. New York: Basic Books, Inc., 1980.

Parker, J. The process of writing. Don Mills, Ontario: Addison - Wesley, 1983.

Scardamalia, M., Bereiter, C., Fillion, B. Writing for results: a sourcebook of consequential composing activities. Ontario: OISE Press., 1981.

Shaughnessy, M. Errors and expectations. New York: Oxford University Press, 1977.

Smith, F. Writing and the writer. New York: Holt, Rinehart and Winston, The Dryden Press, Saunders College Publishing, 1982.

Spandel, V. & Stiggins, R. Direct measures of writing skill: issues and applications. Portland Oregon: Northwest Regional Educational Laboratory, 1981.

Strickland, R. Evaluating children's compositions. In A. Burrows et. al., Children's writing: research in composition and related skills. Champaign, Illinois: NCTE, 1960.

Summers, E. Instruments for assessing reading attitudes: a review of research and bibliography. Journal of Reading Behavior, 1977, 9, 137-165.

Watt, D. Tools for writing. Popular Computing. January 1984, 75-78.