7-1987

Effects of Teaching Writing with Computer Word Processing

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EFFECTS OF TEACHING WRITING WITH COMPUTER WORD PROCESSING

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Submitted in partial fulfillment of the requirements
for the Master of Arts in Education degree
Lindenwood College
July 13, 1987

Accepted by the faculty of the Department of Education, Lindenwood College, in partial fulfillment of the requirements for the Master of Arts in Education degree.

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ABSTRACT

To justify the expense and time involved in teaching word processing to junior high students, an attempt was made to demonstrate an educational benefit, the improvement of student writing. Two classes of eighth grade language arts students were instructed in writing using a computer word processing program, and three other classes wrote without computers. At the beginning and end of the unit, the students in both groups completed a writing assignment, which was evaluated by two different readers in order compare the of quality of writing.

The average posttest scores of students in both groups declined, and scores declined slightly more in the experimental group. A survey completed by the students indicated positive attitudes toward word processing. Therefore, although it was not possible to demonstrate a significant improvement in the quality of student writing after a ten-week period of instruction in word processing, the improvement in the students' willingness to write indicates that the computer can be a valuable addition to the tools available for use in the teaching of writing.

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Sincere gratitude is owed and gladly given to the many people who helped with this project.

Thank you to Chris Simon, Greg Wrinkles, and Tiffinia Johnston for helping with the organization of the pretest and post test compositions so that they could be graded "incognito."

Special thanks to Margie Bezzole, for typing the control group compositions, and for being gracious enough to declare that it was interesting and fun to do so.

Thank you to Rich Wittneben of Computer Junction for keeping the computers operating.

For spending a beautiful Saturday scoring over three hundred papers, there are not enough ways to say thank you to Patrice Feldmann and Barbara Sido.

Thank you to Dr. Jeanne Donovan and Dr. Gene Henderson for providing encouragement and direction, as was often needed,

to Jane Flinn for sharing the information and the feeling of shared purpose of the Gateway Writing Project,

and to Mary Gismegian, Donna Moore, Verna Fussner and Joy Kinder for providing support all through the year in a thousand different ways.

Finally, thanks to my students for their patience and their willingness to try new and challenging ideas, even when they didn't immediately make sense.

CHAPTER ONE

Introduction

Using a computer word processing program offers several advantages for most writers. Ease in making corrections is one of the most important. Instead of having to copy an entire page to correct a few errors, the writer has only to type the corrections and have the computer print out a new, correct copy. More complex revisions are similarly simplified by the computer. Whole sentences and paragraphs can be deleted, moved, copied, and moved back again as the writer tries out different ways of writing the piece. By decreasing the tedium of revising and editing, the computer can help make writing more pleasurable and rewarding.

Instructors of composition have begun to use computers as writing tools for several reasons: first, to keep up with the "real world," where computers are used for writing on a regular basis; second, to offer individualized instruction on mechanics at the exact moment it is needed; third, as an efficient way for the student to make

revisions; and finally, for help in the prewriting or planning stage of a composition (Wresch, 1984).

Computers could be the greatest boon to writers since "Gutenberg's little invention" (Bleau, Ratts, Cunningham, & Yeazell, 1986). Cunningham described the special advantages of word processors to help dyslexic students. Ratts described student use of a modem to access information in the DIALOG databank, eliminating much of the tedium of research. Papert (1980) reported that children in his M.I.T. computer center went from complete rejection of writing to intense involvement and rapid improvement in writing within a few weeks of beginning to write with the computer.

The computer may well become even a more valuable tool than it is now. Scholastic Inc. has developed a word processing program that uses a voice synthesizer to say each letter as it is typed, each word as it is completed and, on command, read the entire text on the screen. Students can use the program to learn the alphabet, to help with reading skills, to hear messages written by others, and to hear and evaluate their own writing (Using computers: Newsflash, 1986).

The development of writing skills is a priority goal in education. According to a study by the National Assessment of Educational Progress (NAEP), writing skills of U. S. schoolchildren are inadequate, with more than half of the students tested being unable to write imaginative descriptions or informative papers (Students' writing skills, 1986).

Computers are very expensive equipment, and it requires time and energy to learn to use them. It is therefore necessary to justify the expenditure of time and money by demonstrating that the student writer will actually improve his or her skills by practicing composition on the computer.

Expectations Based on Past Experience

The use of computer word processing in the spring of 1986 with eighth grade language arts students at Henderson Junior High resulted in good writing and a great deal of enthusiasm toward writing expressed by the students involved. Students used the AppleWorks word processing program, which was favored in a review of word processing programs (Bernhardt, 1984). The AppleWorks program was preferred over "children's" programs, because it

integrated a sophisticated word processor with programs for storing and manipulating data, allowed writers to see on the screen how the text would look on the page, worked very smoothly, and had printing options that covered most writers' needs, with the exception of graphics.

Students began with fairly simple exercises, and most of them had mastered the basics of word processing within a week. The work appeared to captivate the students' imagination and energy. Their final project was more ambitious. Using David Melton's (1985) Written and Illustrated by . . ., the students were directed to write eight-page books and draw eight pages of illustrations to bind into hard cover books. Collaboration was encouraged, and soon they were consulting in front of the computer screens, deciding directions for plot and character development, helping with spelling problems, and offering each other encouragement.

Their confidence and skills with the word processor seemed to improve steadily. They become bolder in the use of more sophisticated commands, such as move, copy and replace. They also became more independent of teacher assistance, beginning work without prompting and seldom needing help with

the computer. Teacher input was directed more toward writing decisions at this point.

Sharing the computers was a problem for some students, but it appeared to be helpful to others to have someone with whom to share the writing experience. When students were offered the option of working on literature assignments instead of the books, only ten students of a total of 150 chose to do so. Many students came to the lab during study hall and after school to spend extra time writing. After the assembly of the completed books, there were two days scheduled for the students to read and respond to each other's work.

Several students displayed talents that had not been demonstrated in the course of regular assignments. Even students who had done very little work in class during the earlier part of the year produced good quality, carefully completed works. The pride they felt in their work was apparent, and their interest in each other's work was above average for the usual eighth grade class. As one student expressed it, "In school, we don't usually get to do anything that is important to us, that is our own."

Study of Student Writing

The positive subjective impression of the value of computers in composition led to a decision to conduct a more formal study to obtain a more accurate evaluation of the effect of computer word processing on the quality of student compositions. An evaluation of compositions written on the computer and compositions written with pen and paper attempted to measure any change in the quality of student work when the computer was used.

Two classes of eighth grade language arts students were instructed in writing using a computer word processing program, and three other classes wrote without benefit of computers. At the beginning and end of the unit, the students in both groups completed a writing assignment, and each paper was evaluated by two different readers, using a common grading rubric, in order to make a comparison of quality of writing. The null hypothesis for this study was that teaching eighth grade language arts students to use computer word processing would not result in a measurable improvement in quality of their written compositions.

Summary

Claims have been made that computers have the potential to change the way people work, write, and perhaps even think. In using computer word processing, many adult writers report an ease and efficiency in composing and editing their work. The efficiency of the computer as word processor could be helpful to the beginning writer as well. To justify the expense and work involved in teaching word processing to junior high students, it would be necessary to demonstrate an educational benefit, an improvement in the quality of student writing.

CHAPTER TWO

Review of Literature

Debate continues on whether or not the student writer will improve his or her skills by practicing composition on the computer. Users of word processors are fairly consistent in their feeling that the word processor is improving their writing. However, research available on this question seems to be divided, with some studies apparently showing improvement, but others showing no significant improvement in the quality of writing on the word processor.

Effect on Quality of Writing

Adams (Tamplin & Adams, 1986) reported that the technology, including the need for typing and computer skills, bugs in the system, and time spent waiting for a limited number of computers, got in the way of the writing at the Chelmsford High School writing lab in Massachusetts.

On the other hand, some teachers worried that the ease of writing on the computer would "spoil" the writer's willingness to write by slower methods when the computer was not available (Jarchow, 1984). A writer who uses pen and ink is able to write virtually anywhere, while the computer is only available at certain places and times, at least at present. This lack of access could be a hindrance if students began to think that they were able to write only on the computer.

In addition, some people expressed fear that the use of the computer would result in deteriorating handwriting (Knapp, 1986). This could be a problem, especially if the use of the computer began at a very early age, when students have not yet acquired skill in penmanship. For junior high students, handwriting styles and habits have already been firmly established, and often students with seemingly hopeless penmanship would be well-advised to learn to type as soon as possible. The addition of an alternate writing tool would give students an opportunity to present at least some of their work attractively.

Oliver (1984) felt there were problems when the computer was used as the evaluator of compositions.

It could not consider coherence, logic, complexity, ambiguity, or even most of the rules of grammar and usage. Instead it was likely to impose a stylistic simplicity because of its reliance on word counts and other artificial indicators, which could be counter-productive to the development of personal writing style. It could also discourage efforts to express complex ideas, fostering instead a "play it safe" style of writing, using only very short, simple sentences.

Cockburn (1986) complained that word processors degrade the prose style of writers. "The syntax takes on a listless quality . . . the rhythms become nerveless . . . what is produced is not script but transcript, the self-indulgent flow of someone assured that the cursor . . . is emulating the justice and finality of properly accomplished prose" (p. 22). Writing, according to Cockburn, loses continuity, significance, and permanence when editing and writing are done on the artificial medium of the VDT (Video Display Terminal) screen. The desire of publishers to increase productivity, by eliminating copy editors, typesetters, and research interns, causes them to espouse the use of word processors, which transform writers into industrialized

information inputters, with no final authority over their own prose.

A report in Learning magazine ("Using computers," 1986) gave the results of a questionnaire completed by 582 teachers, which showed that 95% taught in schools that had computers, 69% responded favorably to the use of computers in elementary schools, and 72% noted improvement in students' schoolwork. More than half (56%) cited inadequate time for students on the computer as a major complaint. Among positive open-ended responses were "better creative writing" and "enthusiasm for writing" using word processing and students coming in during free time and before and after school to use the word processor.

Jarchow (1984) reported that the advantages outweighed the disadvantages of using computer word processing. Negative factors included the possible loss of individual style through simplistic approaches, development of poor typing habits, loss of text from memory, lack of portability, and expense. Advantages included help in overcoming writer's block, ease of rewriting and editing, increased willingness to accept criticism and make

revisions, production of clean attractive drafts, and help with spelling.

Murray Suid (1985), a writing teacher from Palo Alto, California, who carried a MacIntosh computer with him on tour, reported that his daughter, a high school student, developed an awareness of correct spelling when she was able to run a spelling check on her papers before printing a final copy. Before she had access to the word processing program, she was not aware of certain misspelled words, and being told of misspelled words after she finished the final copy was frustrating rather than helpful to her.

Solomon (1985) wrote that studies showed that sixth through twelfth graders corrected more of their mechanical errors when using word processors than they did when using typewriters. There was an indication of a small improvement in style and correctness, and a large improvement in attitude toward writing, which could be significant.

In a study by Hult (1985) of two college freshman writing classes, the use of computers did not result in a significant improvement in correctness, with the exception of a consistent improvement in spelling. Since a spelling check program was used, that improvement was to be

expected, but it did nonetheless result in papers which were easier to read and understand.

Experienced writers can apparently produce more and better writing if the word processing equipment is sufficiently advanced (Haas & Hayes, 1986). Design advances, such as faster machines, screen-oriented editors, and ergonomically designed workstations and displays, have made writing on the computer more efficient. The fifteen participants in the study at Carnegie-Mellon University, all experienced in using word processing, wrote four letters, two the first day of the study and two the second. One letter was written on paper, and the other three were written in different computer conditions, two of which involved the use of "Andrew," an advanced computing system with software being developed as a joint venture between Carnegie-Mellon and IBM. The other, less advanced, system involved an IBM PC and the text-editor MINCE. When working with the computer, the writers were not allowed to make notes on paper, or get a paper printout of the text.

Time required to compose and the number of words produced were greatest in the advanced computer situation and smallest in the paper and pen writing.

The number of words per minute was approximately the same in all conditions. When quality of writing was measured, writing done with the advanced machine was rated highest in content and overall quality, and writing done on the PC was the lowest, both to a significant degree. Correctness in mechanics was highest for the paper and pen writing, though not quite to a significant degree, and lowest for the PC.

From this study it appeared that computers can either improve or hinder writing, depending in part on the quality of the computer system. There is also the possibility that experienced writers have developed effective processes of writing with the computer, utilizing the strengths and adapting to the limitations of the computer when used for writing.

Dalton and Watson (1986) reported that relatively low achieving learners scored significantly better when using word processing than did low learners using conventional writing process instruction. However, word processing was not equally effective for the relatively high ability students, which was attributed at least in part to difficulty with keyboarding and problems in accessing the microcomputers.

The study involved a year-long word processing program with eighty seventh grade students, drawn from four remedial language arts courses. Students produced two writing assignments of one to two pages of text per week and four major papers of three to five pages during the year. Evaluation at the end of the year took the form of a writing sample which was evaluated by three independent, "blind" scorers. Scorers used five criteria: structure and organization, correct use of the parts of speech, punctuation, capitalization, and spelling.

Students in the word processor group used the Freewriter word processing program, a public domain program. They completed all of their writing assignments on an Apple IIe computer, to which they had access for approximately three instructional periods per week. Assignments included fictional short stories, letters, and expository prose. Students in the conventional group used pen-and-paper methods to complete the same types of writing activities.

The study involved a 2 X 2 completely crossed treatment, featuring two levels of treatment, word processing and conventional writing, and two levels of prior achievement, high and low. The relatively

low achieving learners using the word processing treatment scored significantly better than the low learners in the conventional treatment group. Also, teachers involved in the study noted that the learners using the word processor required less encouragement to revise drafts of their writing and generally spent more time in revision than did the students using pencil and paper. Interviews with learners in this study suggest that the word processor made the writing process more pleasant for them, because of the simplification of corrections and the elimination of much of the physical discomfort they had associated with writing by hand.

There was not a significant improvement for the relatively high ability students. Observations indicated that there were two main reasons for this. First, many of the students had trouble with keyboarding, and found that searching for keys on the keyboard interfered with their concentration while writing. Second, since the computers were located in a separate lab, students felt that the process of relocating was a disruption, and they would have preferred to remain in the classroom. Some students also said that they purposely wasted time during the transition period between the two rooms. Also, some

of the students felt that they neglected doing proper planning for their writing, feeling it was less important since the computer made editing so simple.

The study suggests that word processing does offer an ideal medium for the development of holistic writing skills for many learners. Several recommendations for future study were made, including the investigation of appropriate keyboarding instruction, much as handwriting is currently taught. Also suggested were studies of ways to make the physical environment for the computers less distracting, and methods for emphasizing outlining and pre-writing when writing on the computer.

Effect on Editing

Suhol (1985) proposed a different principle of revision: add first, delete last. The writer should list all the alternatives, and not delete until after choosing the best from the many alternatives. This would allow the text to grow and would encourage the writer to exert authority and control over the available choices. Also, a room full of word processing computers can bring writers together and encourage a sense of enterprise and accomplishment

among the users, an ideal setting for collaborative learning.

Presenting examples of first draft and edited versions of a paragraph gave students the example and encouragement to similarly edit their own work (Kohli "Composing with the word processor" in Thompson, Vaughan & Martz, 1986). The computer also provided the opportunity to work on individual writing problems while the student was writing.

Teachers should urge students to take risks in revision, and the textual materials stored on a computer allow this risk-taking to be less risky. Spelling checkers allow students to write more freely at the early stages of drafting, since they do not have to worry about spelling at that point (Kiefer & Smith, 1983). Search and replace functions can help the writer locate and correct errors in the use of homonyms and other repeated errors. Students do not seem to resent the error-hunting aspect of spelling and grammar checking programs, and they do seem to apply what they have learned from these programs when they are writing without them (Sommers, 1982).

Use of a speech synthesizer with computer word processing resulted in increased levels of editing by young writers (Borgh & Dickson, 1986). In a study

involving 48 children, two groups of three girls and three boys from each of two second grade and two fifth grade classrooms were taught to write using word processors. One group of students began with the speech synthesizer, and the other group had the same word processor without the spoken feedback. After they wrote two stories, the conditions were reversed for the two groups, and each child wrote two additional stories.

Five dependent variables--length, editing, quality, motivation, and audience awareness--were measured. Length was measured by the total number of keystrokes entered, the number of keystrokes in the final version, and the number of sentences in the final version. Editing was measured using keystroke data and analysis of changes in sentences. Quality was judged holistically, using Primary Trait Analysis. Motivation and audience awareness were measured from interview responses.

None of the measures of length were statistically significant, although the means for the stories written with spoken feedback tended to be higher. A significant increase in editing at the sentence level occurred with the spoken feedback. This is especially important, given the general

reluctance of young writers to editing. There was no significant increase in quality or in audience awareness, but there was a significant increase in motivation with the voice synthesizer. The less-skilled writers had the highest preference for the spoken feedback.

Richard Collier (1981) reported that writers made two-thirds fewer deletions and two-thirds more substitutions when using the text editor of a word processing program, and they engaged in twice as much reordering. They made on the average slightly fewer additions, 66% more manipulation of material at the word level and 50% more at the phrase/clause level. There was less correction of surface structure errors and no appreciable change in the overall quality of the revised compositions. Three of the four subjects were positive in their evaluations of their experiences.

The subjects in the experiment were taught basic terminal functions and all knew how to type, although only two were excellent typists. They were required each Tuesday to turn in an original, handwritten essay on a topic that had been assigned the previous Friday. Revising sessions took place on Friday afternoons from two until five, and they generally

had "about an hour" for their revision tasks. During two of the sessions, the subjects provided a thinking aloud protocol by speaking into a recorder everything they thought of while revising. During the last session, the computer terminal was videotaped, to provide a record of revising attempts which might not show up in the finished piece. The student initially evaluated as the most skilled writer of the group made the most improvement using the word processor, and reported the greatest level of satisfaction with the program. Three of the four subjects were positive in their evaluations of their experiences.

Collier used only four subjects, selected from an introductory college composition course on the basis of several writing competence activities. He also did all the evaluations of the revisions himself, although he felt the evaluation instrument was sufficiently objective to keep this from being a problem. Because of funding problems, there was limited access to the computers and there was no control group. The program they used, AES C-20, was more complex and less "user-friendly" than some of the newer word processing programs. For instance, they could see only about one half screen of text at

a time, and it took several commands to insert a word into the text.

Effect on Style

Daiute (1983) stated that writers who use a word processor take more risks because their writing can be easily revised. The "delete" command makes it easy to get rid of awkward or unrelated sentences, and backup copies assure writers that they will be able to retrieve words deleted too hastily. Also, writers can focus on one type of revision at a time, going over the paper several times to find different types of problems. Writers can let computers do the drudge work in writing, freeing themselves to do the thinking.

Madigan (1984) saw an advantage in the feeling of distance from the writing which the computer gave the writer. He stated that our tools shape us, in expected and unexpected ways, changing what we do and how we do it. The first step is "assimilation," Piaget's term for the process of integrating new knowledge into old categories. The next stage is "accommodation," the development of new categories for the knowledge that doesn't fit the old ways of thinking.

When students wrote with pen and paper, they wrote sequentially; what they wrote first appeared first in the paper. When they revised, they worked at the sentence level, almost never rethinking and rearranging the structure of the whole paper. It was as if they were sculptors; the product resisted reshaping. Students working on a word processor began by writing much the same way as with paper and pen, except with a new compulsiveness about making every possible correction. Then, as the students became more aware of what the computer could do, they began to be more radical in their reshaping of their work.

Pedersen (1986) proposed that students write a poetry portfolio, consisting of one or two poems for each of ten or twelve types of poetry defined and illustrated in the unit. He suggested that use of the computer for this unit could make the activities more enjoyable, exciting and creative. The development of graphics and the use of various type styles enliven the text. The ease of editing and the use of commands such as "center" make the task of writing a good copy of the poem easier and less frustrating, especially with a poem form such as the Diamante. The use of the computer can free the

student to think creatively about the poem, rather than the mechanics.

The independence of the learner was emphasized by Newman (1984). He stated that computers could enhance learning when they let learners become self-directed, reflect on their own actions and thinking, and discover how to make technology do what they want. Computers as word processors create situations in which the learners control the machine and use it to generate and manipulate language, discovering what they want to say and learning to play around with language. The computer allows the writer to take risks in revision, because the changes are easy to make and to reverse, using such "sophisticated" commands as search, replace, copy, and move. Graves (1979) reported that children showed the capacity to revise as early as grade one, and that students using word processors tended to write longer pieces.

Miller (1984) warned of the confusing variety of programs available, many of which are not helpful in the development of writing skills. Writing assistance programs differ substantially from each other, but most treat writing as a cognitive act (in contrast to the behaviorist approach of many grammar

programs) and most have as a goal the engagement of students in real writing and the production of connected discourse, usually for a self-selected purpose. Some are limited by their data base, which limits the possible directions the students can take in their writing, and some break the process of writing into such minute steps that writing is hindered by the interruptions. Editing programs may foster a simplistic style and prohibit the possibility of occasionally breaking the "rules" of grammar to achieve a desired effect.

Hult (1986) warned of the danger that the computer may reinforce the poor revision strategies of inexperienced writers, unless teachers consciously teach the writing process along with the word processor. For example, the tendency to see the part rather than the whole of a piece of writing is reinforced by the computer, since only a part of the text can be seen on the screen at one time and, in fact, reading the text on the screen is often more difficult than reading text on paper. The tendency may be for beginning writers to substitute and delete on the computer, rather than add and rearrange, which are perhaps more complicated functions to learn. When students use text analysis programs, the

emphasis on rule violations may mislead a student into thinking that everything is correct, since it has been checked, and also leads a student to focus on small parts rather than rethinking the structure of the whole piece and finding meaning through revision.

Following observation of students' writing problems at Texas Tech University, Hult (1986) developed methods of using the computer during prewriting and outlining, to provide students with a rich source of ideas to use in the composition stage of writing. Students need to be instructed in effective revision strategies, including learning how to add and rearrange text. Text analysis programs should not be run until whole essay concerns have been addressed, and once run, the analysis should be discussed in terms of the rhetorical context of the writing. Word processors can be effective tools for writers, if students of writing are helped to learn the principles of effective composition and how to apply those principles to effective writing with a word processor.

Although editing programs can be helpful in alerting a writer to possible problems in the text, care must be exercised to avoid the possible

mechanization of style (Brohaugh, 1984). A writer must understand the reasons for rules of grammar, in order to know when they can and should be ignored in the interests of style and clarity. Editing programs do not allow for differences in style for formal and informal writing, and will therefore tend to be overly rigid in recommendations. Becoming a "slave" to the program could ruin a writer's personal style. Also, since the grammar and spelling check programs are necessarily limited in their data base, they will often "cry wolf," pointing out "errors" that are correct but not in the data base. In self-defense, the user may begin to disregard even correct recommendations. Editing programs must be considered as supplements to the writer, who must be able to exercise independent judgement in editing the work. The writer must remember that "people use tools, not vice versa."

Simplification of Composition and Revision

Riley (1985) recommended the use of a word processor to eliminate drudgery from writing, simplify the revision process, and allow students to focus initially on content and later on revision and improvement of the work. In addition, he suggested

that students with limited typing ability could benefit from editing exercises done on the computer.

Newton (1984) agreed that the ease of making changes encouraged revisions. He stated that the elegance of computer-prepared documents led the writer to a feeling of pride in the work and greater attention to editing. Also, Compuserve and other electronic bulletin boards helped writers to exchange and gather information and gave them an opportunity for communicating in careful written dialogue. WANDAH (Writer's AND Author's Helper), developed at University of California at Los Angeles, helped with prewriting, planning, writing and revision. Even a text-adventure game like "Zork" was thought to provide valuable practice in careful reading and accurate writing.

Gerrard's (1983) description of the Wylbur text editor highlighted the importance of careful instruction and documentation of the program. By streamlining the manual, instructors were able to eliminate lectures about word processing, and 100% of the students rated the Wylbur system as "effortless" or "manageable."

Miller (1984) predicted that new information retrieval systems would help with research, and

message systems would facilitate purposeful writing and shared projects, perhaps even internationally. Interactive books would encourage reading, and automated dictionaries would assist with writing and study.

Herrmann (1983) summarized many of the debates about the value of word processing and the possibility that computer-assisted writing could transform the nature and quality of writing. He reported that studies of the effects of computers on writing were inconclusive, but seemed to point to greater quantity of writing and greater ease of revision once the basics of the program's structure and commands were learned. Text editors, such as Writer's Workbench, were thought to hold the promise of providing help with revision. However, since language is so complex, the text editor will sometimes be wrong, and the writer must be prepared to make independent decisions.

Effect on Attitude toward Writing

The writing lab at Hazelwood West High School has, according to one student "revolutionized our school" (Wright, 1987). The lab, dubbed "The Write Place," has become a center for writing classes,

tutoring, information about entering writing contests, and the writing club, which publishes a literary journal for the school. It also contains a professional library of books and journals on writing.

Teachers in the lab do not feel that the computers themselves improved the quality of writing, but they believe that the computers were excellent motivators, increasing fluency, encouraging revision, and improving student attitudes toward writing. Students, encouraged by the appearance of computer-printed papers, are more willing to help edit each other's legibly printed papers. Teachers tend to require more extensive revision of computer-written papers, recognizing the relative ease of revising on the computer, and students are less ready to declare a paper "finished" after only the first or second draft.

Teachers and lab staff are available to help students with writing as well as computer problems, and work in process is easily read on the monitor. This makes it easy for the teacher to check on students' progress and have conferences with students about their papers. Copies are printed for the students' use in editing. Since extra copies can be

made, papers can even be taken home by other students for peer editing outside of class.

Wright (1986) reported success with sentence-combining lessons and demonstrations of composition and revision techniques, using a large-screen monitor to display information from the computer. The entire class could see the work in progress and follow the lesson. She has also used the technique of loading the same exercise into all the computers in the lab so that all the students could be working on the same problems at once.

Kurth (1986) reported, from a study of twenty-eight Texas high school sophomores and juniors, that word processing had motivational value, facilitated group discussions, and helped foster peer editing. However, neither the length of the experimental group's compositions nor the amount or quality of their revisions differed significantly from the control group.

Students volunteered for the program, and were excused from their high school campus to work at the University writing center. The students were randomly assigned to either the experimental group or the control group. The experimental group used a computer word processing program, Word Perfect, and a

spelling checking program. The control group had the same writing instruction, but without using computer word processing.

Both groups received twenty-four hours of instruction, and the same instructor taught both groups. However, because of the class period devoted to the basics of the word processing program, the experimental group did, in fact, receive slightly less instruction time in composition. Instruction included prewriting, draft writing, revising and editing, with emphasis on global revisions, rather than surface or word level revisions. Students could submit as many revisions of each of seven assigned papers as they wished, and they were encouraged to consult with their editing groups often, and at least once for each paper.

There was no significant change in the average number of words written by writers in the two groups, nor in the quantity or type of revisions made. An equal number of students in the control group made global revisions, indicating that the instruction in revision given in both classes probably did more to stimulate global revisions than did the use of the word processor. There were significantly fewer

misspelled words in the experimental group, undoubtedly due to the access to a spelling checker.

A fifteen-item questionnaire was administered at the end of the study to measure how the students felt about their writing abilities. The word processing group felt more positive about the instruction they had received, their ability to write, and the editing groups. Observers also noted that the computer screens helped to focus the editing groups' attention on the writing task and that student editors were more willing to read computer-printed than handwritten stories.

The conclusions drawn from the study were that word processing programs can be learned quickly and can be used to enhance the teaching of written composition, but the most important ingredient in any composition program is a teacher who is knowledgeable about the composing processes. There must be instruction in prewriting activities, organizational methods, draft writing, and revision skills and some provision for publishing student work for the writing program to succeed.

Other Factors Affecting Writing

Kean (1983) stated that giving more attention to what students do as writers will result in better writing. Teachers can provide models of good writing to help students work through all the stages of writing: prewriting, writing, postwriting, and publishing. Students need time and proper space for writing. Time in writing class should be spent in preparing the student to write and providing help as the students are actually writing. Space should allow for flexible organization of small groups and individual tutoring as needed. There must be an adequate supply of reference material and equipment, including dictionaries, grammar handbooks, typewriters, and word processors.

A research team at the Harvard Graduate School of Education could not find a specific and generalizable impact on classrooms, teachers, and students as the result of the introduction of QUILL writing programs into two sixth grade classrooms. (Michaels, 1986). Instead, the computers were shaped to fit the existing social patterns of the classrooms. Since the learning environments differed, the same computers with the same writing software were used differently, as different writing

tools. Researchers came to think of the computer as a "dependent" variable or a reflexive influence, affected by and influencing the classroom context.

Over a two-year period, the researchers studied two sixth grade urban classrooms as they made use of the computer as a part of their writing process. For the first half of the first year, the classes worked without the computer. In the second year, the computer was brought in during the first month of school. Researchers used observation, tape recordings, ethnographic interviews with teachers and students, analysis of text editing tasks, and a range of writing samples, including pretest and post test writing. Particular emphasis was on the analysis of the "writing system" of the classrooms, by which is meant the activities, norms, rights, and obligations for speaking and acting, including the uses of technology. The writing system is the day-to-day practice of the curriculum, shaped primarily by the teacher, but also by the students and by outside forces.

Approximately half of the students in both classes were Portuguese, several were Spanish speaking, several were from the Orient, and one was East Indian. Students who spoke only English were in

the minority. The teachers in both classes were regarded by their principal and school administrators as outstandingly enthusiastic and dedicated. They worked together on joint projects and field trips and conscientiously worked to keep interruptions and bad influences from interfering with their students' learning environment. Mrs. Smith had what could be called a more "traditional" and structured style of teaching, while Mrs. Jones' style was more individualized, stressing independence and self-control. Most of the characteristics of their particular writing systems relating to assignments, teacher conferencing, corrections, and pacing were not changed by the computer.

Mrs. Smith's class wrote one draft of a paper, received corrections from the teacher, and then wrote a final copy. During the second year Mrs. Smith's students did have some opportunity for interaction and peer conferencing, as the result of being a more "cooperative" group of students for whom she adjusted the seating chart, seating pairs of students together. Mrs. Jones' students wrote several drafts, sometimes as many as five or six, and conferenced with the teacher on each draft. They also had more opportunities for informal peer editing and sharing

of writing as a result of the seating arrangement in clusters of four and of the teacher's tolerance of quiet talking at the students' desks. Mrs. Jones' students also used the computer informally, to write letters to one another and to read each other's library files during silent reading periods.

Mrs. Smith became quite proficient with the computer software and developed wall charts to help students learn the editing commands, which fourteen of her 17 students did. Mrs. Jones admitted to not liking computers, and did not become truly proficient with the program. The first year that the computer was in her room, only one student in her class learned the basic commands. He became the recognized "computer expert" of the class and assisted other students to some degree. During the second year, several students, boys as well as girls, became computer "experts," and Mrs. Jones made sure that the experts did teach the other students how to use the commands.

While Mrs. Smith continued to use more of the technological capabilities of the computer, in storing information, changing layouts of material, text editing, and other applications, both teachers made reasonable decisions about implementing the

computer in line with their overall instructional goals. In neither case did the computer radically reorganize the classroom, though it did create some new opportunities and purposes for writing. These opportunities were not the same in both classrooms, but rather were extensions of the unique situation in each room.

The computer is not the deciding factor in writing. The computer is only a tool; the writing instruction makes the difference. This needs to be considered in the training of teachers and in the development of computer labs and writing curricula, in order to appreciate and build on teachers' strengths and differences for the ultimate advantage of the students.

If students are to use a computer in a writing course, teachers must provide instruction and proper preparation for writing, including documentation of the procedures and consultation during use of the computer (Gadomski, 1986). Instruction for students preparing to compose on a computer must include the reminder that the computer is a tool for writing in the same way that a pen and paper are tools. The goal is to maximize the student's sense of control. Instruction should provide the student with

familiarity with the hardware and its availability, the keyboard, and the special command keys. Even more important is a thorough introduction to the software, to allow the student to use text commands for radical revisions of their work. Lack of sufficient instruction can cause students to become frustrated and to spend more time and energy on mechanical procedures rather than composing, editing and revising their work.

In fact, computers are already in the schools, ready to work for the students in whatever capacity is assigned to them. The National Education Association reports that in 1985 there were 800,000 computers in schools, serving 39 million students (The computer invasion, 1987). This figure means that there are approximately 50 students per computer, while in 1983 there were 125 students for every computer. The numbers vary significantly from state to state, from an average of seventeen students per computer in Alaska, to 86 students per computer in Hawaii. It is up to educators to determine how best to have these computers work for the benefit of the students.

Administration of a questionnaire on the use of microcomputers to a stratified random sample 983

students in the four secondary schools of the Eugene, Oregon, school district (Carey & Gall, 1986) showed that one third of the students had used a microcomputer at school in the two months prior to receiving the questionnaire, and one third of the sample had used a microcomputer at home. Students who used the computer at school averaged two to three hours per week of use, with BASIC programming and word processing being used the most. In home use, entertainment predominated, but BASIC and word processing were also reported as popular activities, showing some transfer of the school's emphasis on the computer as a tool. The students using the computer at home tended to spend between three and six hours per week on the computer activities. Over half of the students who used a computer at school (53.7%) reported working on it for personal use. The next two highest areas of use were English (33.5%) and business education (30.8%).

Analysis of the use of computers in schools in the Beverly Hills schools (A microcomputer utilization study, 1986) showed that the main concerns of parents were that there should be enough computer time for the students, and that trained teachers should be available. Teachers' main

concerns were that the machines should be available regularly and that in-service training be provided. The study recommended a systematic training program for teachers and that the instructional use of software include higher order thinking skills.

Wilson (1981) proposed that English teachers be involved in teaching students to use computers, since they are qualified to provide the necessary writing instruction, build habits of analytical thought, and give direction to the applications of the word processor.

Computer programs need to be carefully evaluated in terms of how well they foster learning (Miller, 1984). Programs should help the students develop effective strategies for understanding and producing language, encourage the expression of ideas, be of the highest quality, and combine the talents of teachers with the capabilities of computers. Word processing programs facilitate a whole language approach to writing, if the teacher's theories in action favor that use. The key to success in the development of new programs will be in tailoring them to the individual needs of the students.

Knapp (1986) reminded teachers,

> No matter how powerful the word processing tool is, it can't teach a student how to write . . . that job still belongs to the classroom teacher. The teacher was, is, and probably always will be the most crucial force in the process of helping students learn to write. (p. 218)

Olds (1983) referred to Piaget's view that learning proceeds best when a person can actively engage in direct experience of the world and then share the experience with other people. Properly used, the computer can help with both activities. For example, Seymour Papert's Logo language creates a "microworld" in which the learner can freely experiment and learn from mistakes, with no ill effects. Olds repeats Joseph Weizenbaum's warning that, like every other new technology, the computer extends our capacity to do good or evil.

CHAPTER THREE

PROCEDURES

Purpose of the Study

The purpose of this research was to compare the quality of writing produced by students with and without computer word processors. By studying the effect of computer word processing on the writing of junior high students, a judgement could be made of the value of investing in word processors for education in composition. To justify the expense and work involved in teaching word processing to junior high students, it would be necessary to demonstrate an educational benefit, an improvement in the quality of writing by students, perhaps along with an improvement in their willingness to write and their enjoyment of writing.

The Null Hypothesis

Teaching eighth grade language arts students to use computer word processing will not result in a

measurable improvement in quality of their written compositions, as measured by a grading rubric adapted from one used by Diederich (1974).

Treatment and Evaluation

To test this hypothesis, two eighth grade language arts classes were taught to use computer word processing for writing compositions, and three other classes, the control group, were taught the same lessons in composition, using pen and paper. Because of limitations on the availability of the computer lab, and to allow time for setting up and putting away the equipment and program disks, classes meeting during the fifth and seventh periods of the day were used as the experimental group, the group using the computers. Classes meeting during the first, second, and third periods of the day were used as the control group.

Barnwell Junior High School was a public school in St. Charles, Missouri. Families were predominantly white, middle-class, and generally supportive of the school. Students were motivated to seek success, as demonstrated by the fact that the majority of the students completed most homework assignments and showed concern for their grades.

An assumption was made for the purpose of this study that the regular language arts classes would be relatively similar, because assignment of students to classes was done by computer, using an essentially random method of sorting students into available classes. There was some skewing of ability levels in certain classes by the indirect influence of electives such as band and algebra, which attracted high-achieving students and were offered only one or two periods per day. To offset this possible imbalance and to ensure relative equality among the groups, students wrote sample essays before the instruction began, which were compared to samples written at the end, using a grading rubric. The initial scores for the groups were comparable.

The classes were relatively similar in size as well. Class sizes were as follows: first period, 28 students; second period, 28 students; third period, 25 students; fifth period, 32 students; and seventh period, 30 students. Several students moved away during the study or were absent for the post test writing, causing the final numbers of students to be lower, with 16, 23, 19, 26, and 22 students respectively. There were 58 students in the control group and 48 students in the experimental group.

Both groups spent two fifty-minute class periods per week for ten weeks working on composition. The assignments and amount of time spent on each assignment were as similar as possible for all groups, except that the experimental group completed their assignments using a computer word processor, and the control group used paper and pencil or pen. A conscious effort was made to keep the instruction of the two groups as similar as possible. No computers were brought into the classroom until the experiment was concluded. All hands-on computer instruction was done in the computer lab so that there would be no influence by the computers on the control group.

Activities for Writing Instruction

Students in the experimental group were given a two-page handout on the basic commands of Appleworks (see Appendix B), along with a chart showing the location of keys and the proper fingering for touch typing. Students did not practice keyboarding separately, nor were they required to use proper keyboarding technique, as the time allocated for work in the lab was so limited. Students were, however, encouraged to attempt proper keyboarding, and the

advantages of the touch-typing method were stated several times and were modeled by the instructor.

After a brief overview of the material, students were instructed to read and review the handouts to prepare for using the computer lab. A short quiz, also illustrated in Appendix B, provided a check on their learning. A review of the quiz in a following class period provided extra instruction for those who needed it, and students were instructed to bring their handouts and corrected quizzes to the lab to help them remember the commands and procedures. When the class began working in the lab, a simplified version of the handout was taped on each monitor, to be flipped down over the screen when help was needed. A list of basic commands was placed just above the keyboard for quick reference.

A series of practice exercises was saved on the back of the program disk. These were used to help the students gain proficiency with word processing commands. Examples of the templates for these activities are shown in Appendix C. Students were taught to rename the files in order to save and retrieve their own work. The disk containing the sample activities was covered with a write-protect tab, to prevent accidental erasure of the samples by

anyone who might try to save a file without properly changing the file name.

The computer lab had fifteen Apple IIe computers, but no printers. In order to accommodate the needs of the largest class, which had thirty-two students, an extra computer on a cart was checked out from the school library. This computer came with a printer, which was used to print copies of the students' work. Later, the school added two printers and another computer to the equipment permanently placed in the lab, making the students' use of the lab for writing much easier.

During the brief introductory instruction period, when actual writing assignments were not yet being worked on, students in the control group read plays in class. The experimental group read the same plays the following quarter, while the control group was learning the basics of word processing in preparation for work on their eight-page books. Therefore, as far as possible, both groups eventually received the same instruction. Once basic competence was achieved with the word processor, the remaining writing assignments were, as far as possible, identical for the two groups and given on the same days.

The first assignment was to write a short preposition poem. This provided an opportunity to compose an original work, as well as to practice the grammar lesson they were working on at the time. The pattern of the assignment also provided a clear focus for the work, so that students would be able to work right away, without having to wait for an "idea."

Students in the lab obtained, from the sample disk, the file containing the instructions and pattern for this short poem, renamed the file, and began typing their versions. Students were sharing computers and were involved in helping one another write, not only as peer editors and audience, but also as computer consultants. They helped each other find the correct commands for getting a file from the disk, renaming it, writing the poem, and saving it. The list of prepositions in the students' grammar text was photocopied and placed above the computer keyboard, next to the list of computer commands, to provide help in thinking of phrases to use in the poems.

For the students in the control group, the sample poem was printed out in very large letters and posted on the blackboard and walls around the classroom. The list of prepositions was readily

available in their grammar books, which they kept open on their desks while working. Students in this group wrote out the poem by hand, and generally had to work through several drafts to get a good copy. They were instructed to work with partners, to simulate the sharing and interaction happening in the lab, and most did seem involved and helpful with each other's writing, even without the focus of the computer monitor.

Having two days for this assignment allowed both groups time to polish and share their work. Several students in the control group finished their poems on the first day and used the next day to write two or three "extra credit" poems. Most of the students in the computer lab needed all the time to complete their poems, because of sharing the computers and the time needed to work through the procedures for using the computer.

The second week's assignment continued the grammar-related writing. Two exercises from the Warriner's (1977) grammar text were used, both relating to prepositional and participial phrases. The first, Exercise 13, required the students to build a sentence around a given participial phrase. The second, Review Exercise C, began with a simple

sentence and instructed the student to add either a prepositional or a participial phrase to the sentence. This was a very structured assignment, allowing a narrow focus on the correct use of phrases in sentences.

The students in the computer lab were told to bring their grammar books to the computers for this assignment, and they were allowed to work with their partners to complete the exercises. They were encouraged not to retype whole sentences, but instead to insert the necessary words into the existing sentences, using the arrows to move the cursor. Students in the classroom also worked together in pairs, but had to copy the sentences from the book to their paper.

The assignment for the third week was to write short biopoems. The file on the disk contained instructions and a sample poem. For most of the students, it was easiest to begin typing their poems in the space between the instructions and the sample, moving the cursor both up and down from their work to get necessary information on how to write the poem. For some of the slower typists, it was easier to use the delete key to change the sample into their own, thereby avoiding having to retype the entire poem.

For the students in the control group, the sample poem was printed out in large letters and posted on the blackboard and walls around the classroom, and copies were also reproduced for them to have at their desks, since it was a more complicated pattern. Students in both groups worked with partners, helping to edit and encouraging one another in the writing of the poems. Having a very definite form to follow kept the students on task, but the nature of the assignment also allowed them to express their own individuality.

The fourth week assignment, writing a diamante poem, allowed the computer students to make use of the centering option. It also required all of the students to select two opposite ideas or things as the topic of the poem, analyze those opposites in order to compare their respective characteristics, and use knowledge of the parts of speech to correctly follow the pattern of the poem.

The students using the computer found it relatively easy to make revisions in their poems, and as they began to print out the work, they also appreciated the attractiveness of the centering option and the ability to change the type sizes on command. Students in the control group worked

together, revising and improving their poems, but they had to recopy by hand the final version of the poem, after which they were not willing to make any further changes. Some of the control group students; however, went on to illustrate their poems decoratively, thereby enhancing their appearance.

The spelling lesson assignment, given during the fifth week, involved inserting the correct word into each sentence, either by typing it into the space allowed, or by using the move command. Students were pleased with the ability to move text around on the screen. Since this was a relatively short assignment, many of the students went on to complete all or part of the "Pundemonium" assignment, also using the move command.

The control group completed the spelling lesson by filling in the blanks by hand. The pundemonium exercise was also available, but was not actually completed by many, since it was harder. Students in the control group used their extra time for reading or other work.

The sentence combining exercise used in the sixth week filled a double purpose. It enabled students in both groups to practice using subordinate clauses, and it allowed the students in the

experimental group to practice editing, using the move and delete commands. Students in the control group worked with sentence combining on dittos, either recopying the sentences or marking the ditto to show the changes they wished to make.

During the seventh week, the students in both classes were instructed to write a description of an object, describing its appearance and what it did or how it was used, but without naming the object. Working with partners, they decided whether the description was clear enough, or what details should be added to make it clear. On the final copies, they put the name of the object at the bottom or on the back of the paper, to allow the reader to be sure of the correct answer and to allow the teacher to evaluate the work. This assignment provided all the students with practice in using descriptive details, and gave the experimental group additional practice in composing on the computer. They also learned how to initiate a new file, as there was no sample file on the disk.

During the eighth week, students were instructed to write a detailed description of a person they admired, using details to give a vivid impression of that person. Again, this gave all the students

practice in descriptive writing and gave the computer group additional practice in composing on the computer and initiating a file.

The ninth week assignment was to write an "I Am" poem, from a pattern published in Voice magazine (1986). The students in the computer lab could write the poem by deleting from and adding to the sample on their disks, but composing the poem required thoughtful contributions from the students' own experience. The students in the control group had to write out their first and subsequent drafts completely by hand.

The tenth and final week was given to the students as a "catch-up" time, to finish any of the assignments missed during the preceding nine weeks and to work on extra assignments. Students in the computer lab worked on free choice activities from the computer sample file disk, such as the abc sentence, mad libs, or word games. Students who were absent were given assistance either by the partners with whom they shared the computer, or by other students who were waiting their turns at computers.

Students in both groups worked together in editing groups, to encourage each other, to provide an audience for the written work, and to help one

another edit for clarity and correctness. In the regular classroom, these groups gathered by moving four or five desks together. In the computer lab, the groups formed naturally around the computer terminals, and changes were often made directly to the text on the computer as discussion progressed. Word processing students also edited printed or "hard" copies of each other's papers.

None of the students in either group, however, were allowed to peer edit each other's post test papers. Peer editing had not been part of the pretest, and the change in writing behavior would quite possibly have changed the results.

Evaluation Methods

The effect of word processing on students' writing was measured by the evaluation of writing samples created before and after the word processing unit. Scoring, according to a rubric modeled after work by Diederich, was used to measure the quality of writing.

Cooper and Odell (1977) described several methods of holistic evaluation of writing, in which the rater could quickly and impressionistically evaluate a piece of writing either by 1) matching it

with another piece in a graded series, 2) scoring it according to certain features defined as important in that kind of writing, or 3) assigning it a letter or number grade. Using a holistic scoring guide, scorers who have devoted the time to practice have achieved reliability as high as .90 for individual writers.

Diederich (1974) described a writing assessment in which two essays per student, identified only by a code number, were each graded by two teachers. Final scores on the essays had a reliability of .70, and when combined with scores on an objective test and a grade for class participation, were used to determine the students' final grades for the term.

For the purpose of this study, students were evaluated according to the following grading rubric, modified from a slightly longer one developed by Diederich. The scale was altered by the elimination of the score for handwriting, since it would not be applicable to the computer-produced papers, and the score for spelling, since there was a spelling checker program available in the writing lab. There were, therefore, thirty-five points possible.

.....

Modified Rubric for Evaluation of Compositions

	Low		Middle		High	
General Merit						
Ideas	2	4	6	8	10	
Organization	2	4	6	8	10	
Wording	1	2	3	4	5	_____
Mechanics						
Usage	1	2	3	4	5	
Punctuation	1	2	3	4	5	_____
					Total	_____

.....

In order to make the control group and experimental group papers indistinguishable, the control group papers were typed on a computer by a parent volunteer and printed on the same type of printer used for the experimental groups' papers. The typist was careful not to correct any errors while typing, so that the finished and printed paragraphs would be a fair representation of the

students' original writing. All names and identification of class period were written on the backs of the papers in order to prevent a skewing of scores because of any expectations of possible results that the graders might have had.

Students wrote on the same topic, "My Favorite Object," for the pretest and the post test. Originally, this was intended to make the pretest and post test samples indistinguishable, but when the decision was made to have all of the post tests computer-printed, this intention was abandoned in favor of the more important goal of making the two sets of post tests indistinguishable.

All of the papers were mixed together randomly by a student volunteer who was uninformed of the purpose of the study. Three language arts teachers worked together on a Saturday to assure that each paper was graded by at least two different graders. Thus, each student had two pretest scores and two post test scores, and the teachers doing the scoring did not know if the papers belonged to the control or the experimental group.

Two readers independently evaluated each paper, and their results were combined to give the total evaluation for each paper. The random distribution

of the three scorers' work among the five classes' pretests and post tests would allow the differences between the individual scorers to be averaged out, as long as each of the scorers remained consistent in scoring. Comparison of a random sample of forty-six pairs of scores showed a Pearson r correlation of .64, which is significant beyond the .01 level.

The pretest score for each student was subtracted from the post test score to yield a "gain" (or loss) score for each student. The original plan was to compare the gain scores of the experimental and control groups using a t test. If the difference between the means of the gain scores was not significant at the .05 level, then the null hypothesis, that there was no statistically significant improvement in writing skills for junior high writers using computer word processors, must be accepted.

CHAPTER FOUR

Findings

Two eighth grade language arts classes were taught to use computer word processing for writing compositions, and three classes were taught the same lessons in composition, using pen and paper. Assignments included descriptive writing, short poems, and sentence combining. In both groups, students worked in peer-editing groups of three to four students, to help one another edit and to provide an audience for the writing.

Students wrote sample essays before the instruction began, which were compared to samples written at the end, using a grading rubric. The experimental group wrote their post test writing samples on the computer, while the control group wrote by hand. Peer editing was not used on any of the pretest or post test writing samples. Two readers independently evaluated each paper, and the scores were combined to give the total evaluation for each paper.

Comparison of Writing Samples

As shown on the graph which follows, the scores for the students' compositions generally declined from the pretest to the post test. In the control group, the first period class score declined from 51 points to 46.5, the second period declined from 52 to 49 points, and the third period from 54 to 50 points. In the experimental group, the scores for the fifth period class declined from 51 to 42, and for the seventh period class, scores declined from 57 to 49.

It was not necessary to do the proposed *t* test to measure improvement with the word processor, since there was no improvement. The average amount of decline was, in fact, somewhat larger for the classes in the experimental group, the group using the computers. More detailed data on the individual scores is shown in Appendix A.

It was observed during the post test writing that the classes using computers tended to finish working on their essays earlier. They were also not willing to spend any additional time on the writing once they declared themselves finished, even though it was suggested to them that they might use the remaining time to add to or edit their papers.

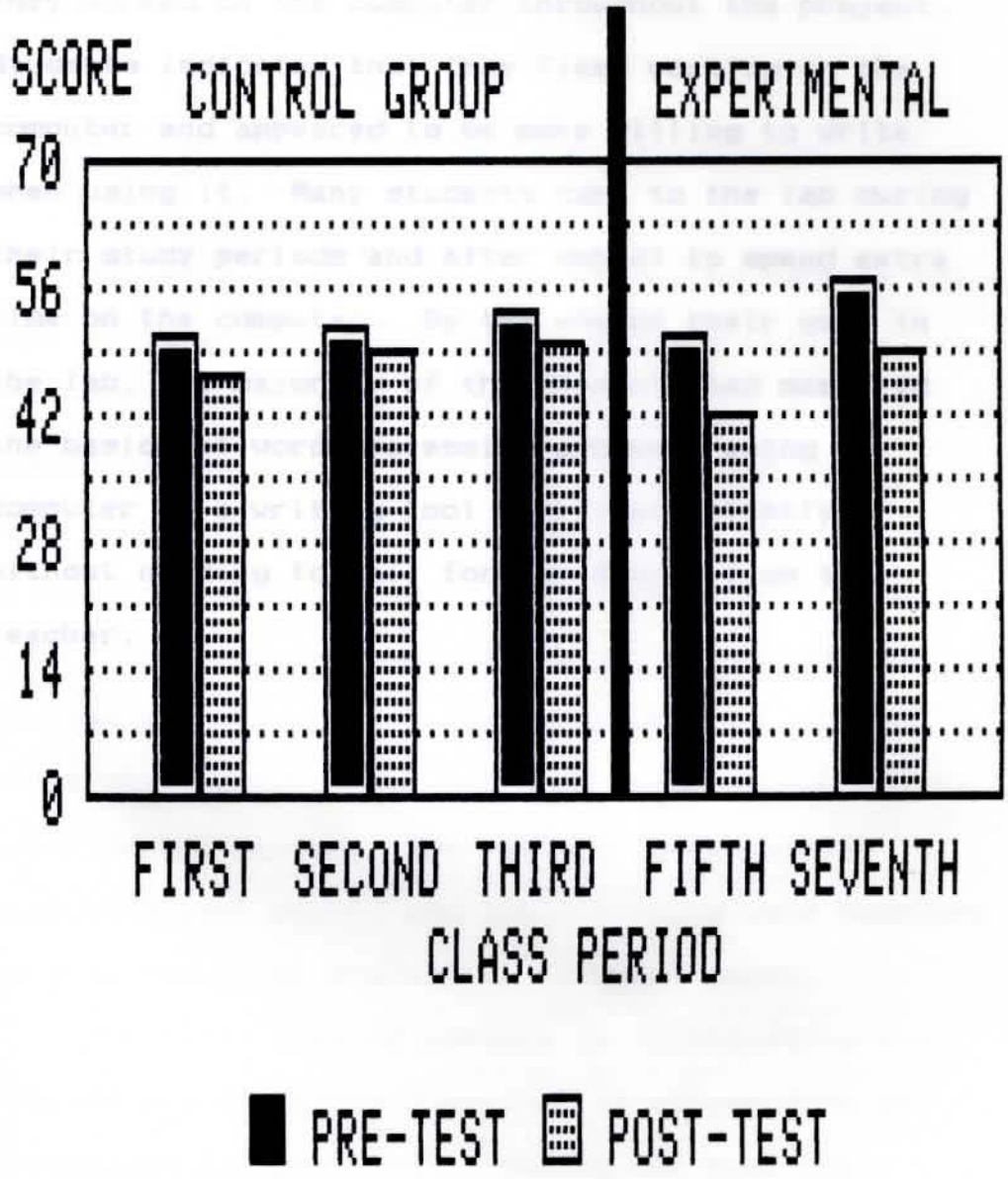

Figure 1: Class Averages of Writing Sample Scores

The negative results of the writing assessment seemed to contradict observations of the students as they worked on the computer throughout the project. Students indicated that they liked working on the computer and appeared to be more willing to write when using it. Many students came to the lab during their study periods and after school to spend extra time on the computer. By the end of their work in the lab, the majority of the students had mastered the basics of word processing and were using the computer as a writing tool fairly efficiently, without needing to call for assistance from the teacher.

CHAPTER FIVE

Conclusions, Limitations, and Recommendations

The purpose of this research was to compare the quality of writing produced by students with and without computer word processors. Students wrote sample essays before the instruction began, which were compared to samples written at the end, using a grading rubric. The experimental group used computer word processing in completing writing assignments for ten weeks and for their post test writing samples, while the control group wrote by hand throughout the experimental period. Two readers independently evaluated each paper, and their results were combined to give the total evaluation for each paper.

The first area of concern in interpreting the results was the overall decline in scores from the pretest to the post test. Having the same topic for both sets of essays was an unfortunate decision, because junior high students are easily bored, and the generally lower results on the post test most

likely reflected boredom with the topic. Students protested the repetition of the topic and reported an inability to think of "anything else to say." Some individual papers displayed an unwillingness to stay with the assigned topic. Several students wrote about a favorite person, rather than writing a second time about an object. Others wrote, describing the favorite thing without saying what it was, making the assignment into a guessing game, similar to an assignment completed in class a week earlier.

After the study was finished, students were asked their opinion of the reason for the decline in scores, and most of them agreed that they were less motivated when writing the second time. In retrospect, it would have been better to use a different topic for the post-test paper, to produce the spark of interest which is important to good writing.

In addition, all of the writing assignments during the period of the study were shorter and more structured than the evaluated essays. It would have been better to have added at least one longer and more open assignment to the course of instruction. Failing that, the pre-test and post-test writing

could have been made more similar to the assignments completed during the unit.

One of the three teachers scoring the papers remarked that she felt that the uniformity of the computer-printed papers detracted from the "charm" she perceived in the students' own handwriting. The other readers preferred the improved ease of reading the computer-printed papers. In either case, the subjective response to the appearance of the papers may have affected the comparisons. If it had been possible to secure more typing assistance, it would have been worthwhile to have the pretests computer-printed also.

There are several possible explanations for the greater decrease in scores for the experimental group. One possibility, of course, is that writing on the computer is not as good as writing by hand. Another explanation is that twenty fifty-minute classes do not provide enough time to become fully competent in the use of this tool, especially with students sharing the computers, and each student using the computer only half the time. At the time of the post test, the students had spent approximately eight hours and twenty minutes writing on the computer. The computer and its commands were

still somewhat distracting to them, and the job of remembering all the "steps" for word processing was still demanding and fatiguing. However, making the experimental period longer would not have been fair to the control group in this instance, since it would have deprived them of their opportunity to make use of the computer in the next unit of instruction.

Attitude toward Writing

Observations of the students as they worked on the computer indicated that they liked working on the computer and were more willing to write when using it. A few students had seemed to feel confused and frustrated at the very beginning, because of all the commands and the different disks. There also had been some problems in attempting to teach the proper care of data disks. Caught up in the imaginative act of writing, students would sometimes forget to be careful with the relatively fragile disks. Three damaged disks did have to be replaced and a small amount of lost data had to be retyped as a result, with some distress to the students involved. However, by the end of their work in the lab, the majority of the students, even the less gifted students, had mastered the basics of word processing

and were using the computer as a writing tool fairly efficiently.

Students' ongoing interest in using the computers was demonstrated by their willingness to come to the lab during study periods and before and after school. Also, students vied for permission to use the instructor's Apple IIc computer, which was kept in the classroom once the experimental period was over, as well as any extra computers brought to the classroom from the library. Several students expressed the feeling that using the computers was "more fun than working."

One student wrote in his journal the following, completely unsolicited, endorsement of computers:

> I like computers. I am glad that in Language we went to the computer lab.
> I have an Apple IIc at home but I didn't know how to use my AppleWorks or my printer. Now I know how to use my disk drive, keyboard, and printer.
> I write my best friend using the printer. I also keep a record of my baseball cards on a data disk.
> Now I really enjoy my computer.

Survey on Student Attitudes

In an attempt to gain more information about the dichotomy between the negative results of the evaluation of the writing samples and the students'

apparent enthusiasm for working with the word processor, a survey was administered to students in all five classes, following their use of the word processor. Respondents were not required to sign their survey forms, so that they could feel free to respond exactly as they felt. They were also not allowed to discuss their responses among themselves.

Students generally expressed very positive attitudes toward using the word processor for writing. In responding to the survey, 79% reported that they enjoyed learning to use AppleWorks and thought it was easier than writing by hand, 93% thought the final product was better, 68% wanted to continue using word processing, and 86% would recommend word processing to other students. Among the aspects of word processing that they liked best, students most frequently listed that it was easy, fun and looked better, and that they liked typing. Among the things that they liked least, the most frequently listed were typing, complicated and confusing commands, changing the disks, and sharing computers. Full details of this survey are shown in Appendix D.

Conclusion

This project did not demonstrate an improvement in the quality of student writing after a ten-week period of instruction in word processing. However, the improvement in students' willingness to write and their ability to improve their work on longer projects indicated that the computer can be a valuable addition to the tools available for use in the teaching of writing.

Recommendations

Further studies are needed to determine how to best use computer word processing to teach writing.

1. A study involving a longer period of use of word processing in writing would demonstrate if greater familiarity with the system would improve student writing when using word processors.

2. A study of the effect of teaching proper keyboarding or touch typing techniques would demonstrate whether keyboarding should be taught prior to the introduction of computer word processing.

3. In future studies, it would seem to be advisable not to have the same topic for the pretest and the post test.

4. The pre-test and post-test writing should be comparable in length and type to the assignments actually completed during the unit of instruction.

Appendix A

Results of Evaluation of Student Writing Samples

Results of Evaluation of Student Writing Samples

	PRETEST WRITING SAMPLE - -							POST TEST WRITING SAMPLE- - -							DIFFERENCE
		SCORE 1			SCORE 2		TOTAL		SCORE 1			SCORE 2		TOTAL	DIFFERENCE
								FIRST PERIOD -- CONTROL GROUP							
al	1	18	6	24	25	10	35	59	20	9	29	13	8	21	50	-9
bs	1	22	8	30	20	7	27	57	22	7	29	15	5	20	49	-8
cb	1	24	6	30	25	9	34	64	20	8	28	22	8	30	58	-6
cw	1	20	8	28	22	9	31	59	20	8	28	18	8	26	54	-5
dm	1	20	5	25	19	4	23	48	22	8	30	20	7	27	57	9
dm	1	17	5	22	22	8	30	52	17	8	25	6	5	11	36	-16
eb	1	18	6	24	25	8	33	57	13	6	19	8	2	10	29	-28
ek	1	17	4	21	10	2	12	33	19	8	27	15	7	22	49	16
jo	1	20	8	28	20	8	28	56	25	7	32	13	6	19	51	-5
js	1	17	6	23	19	6	25	48	17	5	22	17	7	24	46	-2
kc	1	13	4	17	18	6	24	41	13	5	18	15	7	22	40	-1
kt	1	23	10	33	20	8	28	61	17	6	23	11	6	17	40	-21
mg	1	22	6	28	21	6	27	55	20	7	27	17	6	23	50	-5
ra	1	17	4	21	8	4	12	33	20	6	26	20	9	29	55	22
sw	1	23	7	30	22	8	30	60	18	8	26	21	6	27	53	-7
tr	1	15	6	21	12	6	18	39	8	4	12	10	5	15	27	-12
AVERAGES								51							46.5	-4.875
								SECOND PERIOD -- CONTROL GROUP							
ar	2	25	9	34	15	4	19	53	20	8	28	12	5	17	45	-8
as	2	10	4	14	12	4	16	30	14	5	19	10	4	14	33	3
bb	2	24	8	32	25	8	33	65	17	6	23	19	6	25	48	-17
cb	2	19	6	25	18	6	24	49	21	5	26	23	4	27	53	4
cc	2	21	5	26	22	6	28	54	19	5	24	17	8	25	49	-5
cs	2	22	6	28	23	6	29	57	17	6	23	24	8	32	55	-2
cs	2	25	10	35	25	8	33	68	14	6	20	15	6	21	41	-27
dg	2	25	8	33	23	9	32	65	17	6	23	21	8	29	52	-13
dm	2	25	9	34	18	4	22	56	18	6	24	20	8	28	52	-4
gc	2	12	4	16	17	6	23	39	19	6	25	22	6	28	53	14
hk	2	21	4	25	20	7	27	52	11	6	17	13	7	20	37	-15
jr	2	7	2	9	17	6	23	32	19	5	24	17	8	25	49	17
kh	2	12	6	18	22	6	28	46	15	6	21	23	8	31	52	6
kp	2	17	6	23	22	7	29	52	21	10	31	25	10	35	66	14
nm	2	15	4	19	15	8	23	42	16	6	22	17	6	23	45	3
pv	2	17	6	23	19	8	27	50	17	7	24	25	8	33	57	7
rb	2	19	6	25	25	9	34	59	17	6	23	16	4	20	43	-16
ru	2	24	8	32	18	6	24	56	15	6	21	16	6	22	43	-13
sp	2	23	9	32	20	8	28	60	19	6	25	23	8	31	56	-4
ss	2	25	10	35	25	8	33	68	15	10	25	20	10	30	55	-13
sw	2	10	4	14	17	7	24	38	22	8	30	25	8	33	63	25
tj	2	25	9	34	25	10	35	69	11	6	17	20	7	27	44	-25
ts	2	22	6	28	14	4	18	46	17	4	21	15	4	19	40	-6
AVERAGES								52							49	-3.2608696

	PRETEST WRITING SAMPLE - -								POST TEST WRITING SAMPLE- - -								DIFFERENCE
	SCORE 1				SCORE 2			TOTAL	SCORE 1				SCORE 2			TOTAL	DIFFERENCE
	THIRD PERIOD -- CONTROL GROUP																
ac	3	12	4	16	10	5	15	31	8	4	12		24	4	28	40	9
bb	3	20	8	28	25	9	34	62	20	6	26		25	8	33	59	-3
bp	3	25	10	35	25	8	33	68	17	6	23		21	8	29	52	-16
bs	3	20	8	28	20	8	28	56	17	6	23		22	7	29	52	-4
bs	3	25	10	35	23	10	33	68	18	6	24		17	8	25	49	-19
cc	3	11	6	17	13	7	20	37	13	5	18		20	7	27	45	8
dg	3	19	6	25	20	8	28	53	20	8	28		19	6	25	53	0
dh	3	17	6	23	17	6	23	46	19	4	23		18	5	23	46	0
dm	3	25	9	34	25	9	34	68	18	6	24		15	6	21	45	-23
dp	3	25	8	33	20	7	27	60	22	8	30		20	9	29	59	-1
jc	3	13	6	19	17	6	23	42	20	5	25		19	6	25	50	8
jh	3	24	8	32	24	9	33	65	22	6	28		24	7	31	59	-6
jh	3	25	10	35	25	10	35	70	20	6	26		20	8	28	54	-16
kw	3	20	9	29	23	10	33	62	21	8	29		25	9	34	63	1
ll	3	18	6	24	17	5	22	46	22	9	31		22	9	31	62	16
ls	3	16	5	21	17	6	23	44	17	6	23		17	4	21	44	0
ms	3	17	6	23	19	8	27	50	12	4	16		21	5	26	42	-8
sm	3	20	8	28	22	8	30	58	8	2	10		20	8	28	38	-20
th	3	19	6	25	24	8	32	57	17	6	23		14	4	18	41	-16
AVERAGES								54								50	-4.7368421
	SEVENTH PERIOD -- EXPERIMENTAL GROUP																
bm	7	20	7	27	20	8	28	55	17	4	21		23	6	29	50	-5
ca	7	25	9	34	23	8	31	65	18	7	25		20	6	26	51	-14
cc	7	20	6	26	19	6	25	51	11	4	15		21	8	29	44	-7
ch	7	17	6	23	21	5	26	49	22	8	30		19	6	25	55	6
dg	7	23	10	33	20	8	28	61	20	7	27		24	4	28	55	-6
jd	7	22	6	28	22	8	30	58	19	4	23		22	8	30	53	-5
jl	7	25	10	35	25	10	35	70	15	7	22		24	8	32	54	-16
jr	7	14	4	18	19	4	23	41	17	4	21		15	3	18	39	-2
kb	7	19	6	25	25	8	33	58	18	6	24		7	3	10	34	-24
kk	7	25	10	35	25	10	35	70	22	7	29		25	9	34	63	-7
lj	7	25	8	33	23	9	32	65	13	7	20		15	9	24	44	-21
ls	7	20	7	27	17	6	23	50	19	6	25		17	6	23	48	-2
mb	7	22	6	28	18	8	26	54	19	6	25		17	5	22	47	-7
mh	7	22	5	27	24	10	34	61	19	6	25		22	8	30	55	-6
sb	7	22	7	29	22	8	30	59	16	4	20		17	6	23	43	-16
sb	7	22	6	28	22	8	30	58	10	5	15		15	6	21	36	-22
sh	7	19	5	24	15	7	22	46	19	5	24		15	4	19	43	-3
sr	7	22	8	30	20	6	26	56	20	5	25		17	6	23	48	-8
ss	7	25	9	34	20	6	26	60	24	7	31		14	6	20	51	-9
tg	7	22	9	31	22	7	29	60	22	7	29		25	10	35	64	4
tl	7	15	5	20	20	4	24	44	18	8	26		17	7	24	50	6
we	7	22	7	29	25	9	34	63	22	10	32		17	8	25	57	-6
AVERAGES								57								49	-7.7272727

	PRETEST WRITING SAMPLE - - SCORE 1				SCORE 2			TOTAL	POST TEST WRITING SAMPLE- - - SCORE 1			SCORE 2			TOTAL	DIFFERENCE DIFFERENCE
FIFTH PERIOD -- EXPERIMENTAL GROUP																
bd	5	14	4	18	15	4	19	37	7	4	11	24	6	30	41	4
bm	5	18	6	24	18	7	25	49	8	4	12	12	4	16	28	-21
bw	5	13	5	18	20	6	26	44	12	5	17	17	6	23	40	-4
cg	5	22	7	29	17	3	20	49	18	8	26	17	6	23	49	0
ch	5	20	8	28	16	6	22	50	14	7	21	15	5	20	41	-9
cs	5	22	5	27	17	5	22	49	17	5	22	20	5	25	47	-2
dg	5	17	5	22	7	3	10	32	17	6	23	17	7	24	47	15
ds	5	17	6	23	20	8	28	51	8	5	13	15	5	20	33	-18
ho	5	25	10	35	23	8	31	66	22	7	29	17	6	23	52	-14
jb	5	19	6	25	19	6	25	50	13	4	17	17	6	23	40	-10
je	5	21	5	26	23	6	29	55	17	4	21	15	6	21	42	-13
jh	5	13	6	19	25	10	35	54	20	8	28	24	5	29	57	3
jrw	5	17	4	21	8	2	10	31	17	4	21	13	4	17	38	7
jt	5	25	8	33	22	6	28	61	21	6	27	17	6	23	50	-11
jw	5	25	10	35	24	10	34	69	20	6	26	20	5	25	51	-18
kk	5	17	5	22	17	8	25	47	15	4	19	13	6	19	38	-9
ms	5	20	5	25	17	7	24	49	8	3	11	10	6	16	27	-22
mw	5	23	7	30	15	4	19	49	17	6	23	16	4	20	43	-6
pm	5	21	5	26	23	6	29	55	16	4	20	13	6	19	39	-16
rj	5	22	7	29	19	6	25	54	13	4	17	13	6	19	36	-18
sb	5	22	9	31	22	9	31	62	25	8	33	20	8	28	61	-1
sb	5	23	9	32	22	8	30	62	20	8	28	17	8	25	53	-9
sl	5	25	8	33	25	10	35	68	14	5	19	17	6	23	42	-26
ss	5	11	6	17	9	6	15	32	12	5	17	10	6	16	33	1
tl	5	15	4	19	22	8	30	49	17	8	25	20	8	28	53	4
tl	5	22	8	30	25	8	33	63	17	6	23	12	5	17	40	-23
AVERAGES								51							43	-8.3076923

APPENDIX B

INSTRUCTIONS AND QUIZ ON THE BASICS OF APPLEWORKS

HOW TO USE APPLEWORKS

I WILL HAVE THE COMPUTER READY FOR YOU, SET UP WITH THE APPLEWORKS PROGRAM. IF THE COMPUTER IS NOT ALREADY SHOWING THE MAIN MENU, PRESS THE ESC BUTTON TO RETURN TO THE MENU.

*** TO BEGIN WORK ON AN IDEA ALREADY ON FILE ***

CHOOSE #1 "ADD FILES TO DESKTOP," THEN #1 "FROM THE CURRENT DISK: DRIVE 1," THEN MOVE THE CURSOR WITH THE ARROWS TO HIGHLIGHT THE FILE YOU WANT, PRESS RETURN, AND YOU ARE READY TO BEGIN WORK. YOUR FIRST ASSIGNMENT IS TO BEGIN WORK ON "PREPOSITION POEM."

*** RE-NAMING A FILE ***

TO PREVENT CONFUSION IN SAVING FILES, PLEASE IMMEDIATELY RENAME ANY FILE YOU RETRIEVE BY PRESSING "OPEN APPLE-N" AND INSERTING YOUR INITIALS AND CLASS PERIOD AT THE BEGINNING OF THE NAME. THIS MAY CAUSE SOME OF THE LETTERS TO BE REMOVED FROM THE END OF THE TITLE, WHICH IS NOT A PROBLEM.

*** TO BEGIN WORK ON A COMPLETELY NEW IDEA ***

CHOOSE #1 "ADD FILES TO DESKTOP," THEN #3 "MAKE A NEW FILE FOR THE WORD PROCESSOR," THEN "FROM SCRATCH," MAKE UP A TITLE (PUTTING YOUR INITIALS AND CLASS PERIOD FIRST), TYPE IT IN, AND YOU WILL HAVE A CLEAR SCREEN ON WHICH TO TYPE YOUR WORK.

*** CORRECTIONS AND CHANGES ***

YOU CAN EASILY DELETE ERRORS. THE DELETE KEY ERASES ANY CHARACTER (INCLUDING SPACES AND RETURNS) DIRECTLY TO ITS LEFT. "OPEN APPLE-D" WILL ENABLE YOU TO QUICKLY DELETE LARGER AMOUNTS; FOLLOW THE PROMPTS AT THE BOTTOM OF THE SCREEN TO HIGHLIGHT MATERIAL TO BE DELETED.

"OPEN APPLE-M" ENABLES YOU TO MOVE MATERIAL TO ANOTHER PART OF THE DOCUMENT, TO TRY NEW WAYS OF ARRANGING THE MATERIAL.

"OPEN APPLE-C" ALLOWS YOU TO MAKE A COPY OF ALL OR PART OF YOUR DOCUMENT AND PLACE IT ELSEWHERE IN THE DOCUMENT, OR EVEN INTO ANOTHER DOCUMENT. WHEN USING THESE COMMANDS, PROMPTS AT THE BOTTOM OF THE SCREEN TELL YOU HOW TO COMPLETE THE ACTION.

*** SAVING TO YOUR FLOPPY DISK ***

HIT "ESCAPE" TO REACH THE MAIN MENU, SELECT #3 "SAVE DESKTOP FILES TO DISK", AND FOLLOW THE INSTRUCTIONS AT THE BOTTOM OF THE SCREEN REGARDING WHICH DISKS TO INSERT WHEN. DO THIS FREQUENTLY TO AVOID LOSING YOUR WORK IN CASE OF POWER FAILURE OR OTHER DISASTERS.

*** PRINTING A "HARD COPY" ON PAPER ***

WHEN YOU HAVE TYPED AND SAVED YOUR MATERIAL, YOU ARE READY TO PRINT IT. SINCE WE HAVE FEWER PRINTERS THAN COMPUTERS, YOU MAY NEED TO PUT YOUR NAME, AND THE NAME OF THE FILE YOU ARE WAITING TO PRINT, ON A WAITING LIST FOR THE PRINTER. YOU SHOULD GO ON TO OTHER WORK WHILE YOU ARE WAITING FOR THE PRINTER. REST ASSURED, YOU WILL GET YOUR TURN.

WHEN YOUR TURN ARRIVES, TAKE YOUR DATA DISK TO THE PRINTER, CHOOSE "ADD FILES TO THE DESKTOP", AND "FROM DRIVE ONE," INSERT YOUR DISK IN THE DISK DRIVE, AND FOLLOW THE PROMPTS TO RETRIEVE YOUR FILE. WHEN YOU SEE YOUR FILE ON THE SCREEN, PRESS "OPEN APPLE-P" TO PRINT THE DOCUMENT, AGAIN FOLLOWING THE PROMPTS TO SELECT PRINTER AND NUMBER OF COPIES (ONE ONLY, PLEASE).

WHEN THE FILE IS PRINTED, ESCAPE TO MAIN MENU, SELECT "REMOVE FILE FROM THE DESKTOP" AND REMOVE YOUR FILE FROM THE COMPUTER TO LEAVE A CLEAR MEMORY FOR THE NEXT PERSON. THIS IS IMPORTANT TO AVOID CONFUSION IN THE FILES AND ALSO TO AVOID OVERFILLING THE MEMORY OF THE COMPUTER. THEN GO QUIETLY TO THE PERSON WHOSE NAME IS NEXT ON THE WAITING LIST, AND INFORM THEM THAT THE PRINTER IS AVAILABLE.

(NOTES ON POSSIBLE PROBLEMS)

DON'T HIT THE "RESET" BUTTON, NO MATTER WHAT YOU DID IN PROGRAMMING BASIC. IT WILL CRASH THE PROGRAM AND YOU WILL LOSE YOUR WORK.

HIT "ESCAPE" TO CANCEL ACTIVITIES OR TO RETURN TO THE MAIN MENU. IF YOU ACCIDENTALLY HIT "ESCAPE," YOU HAVE NOT LOST YOUR FILE. JUST HIT "ESCAPE" OR SELECT "WORK WITH FILE ON THE DESKTOP" TO RETURN TO YOUR FILE.

SPACING: The computer automatically wraps text around to the next line when necessary. Do not use the space bar or the arrows to arrange text, as what

you see (on the screen) is not necessarily what you get (on paper).

Appleworks automatically gives you one-inch margins and ten characters of print per inch. These specifications can be changed by using "Open apple-O" to get the printing options menu.

At the end of each paragraph, hit the carriage return to begin a new paragraph, and either tap the space bar five times to indent, or tap the "TAB" key once. (Tabs can be set for any distances you would like). Do NOT use the return key at the end of a line within a paragraph, and do not begin a new paragraph by spacing to the next line with the space bar. If you do, you will be disappointed in the appearance of your paper when you make changes in your document and when you print it.

WHEN YOU TYPE A COMMA (,) PUT ONE SPACE AFTER IT, AND WHEN YOU TYPE A PERIOD (.) PUT TWO SPACES AFTER IT. OTHERWISE,YOUR PAPER WILL LOOK CROWDED AND CONFUSING.SEE WHAT I MEAN?I HOPE YOU DO.

You can center titles and headings by using the "open apple -O" typing "CN", hitting "Return", then "Escape" to get out of the option screen.
TO "UN-CENTER," USE "OPEN-APPLE-O" AGAIN, TYPE "UJ" OR "JU", HIT "RETURN", THEN "ESCAPE."

DISK CARE : DISKS ARE FRAGILE AND, BECAUSE OF THE INFORMATION YOU ARE PLACING ON THEM, VALUABLE. ALWAYS PLACE THEM BACK IN THEIR PAPER JACKETS AND BACK IN THE DISK STORAGE BOX OR ANOTHER VERY SAFE PLACE. DON'T TOUCH THE EXPOSED PARTS, BEND DISKS, OR SCRATCH THEM. (USE FELT TIP MARKERS ONLY). NEVER PUT DISKS IN OR TAKE THEM OUT OF THE DISK DRIVE WHEN THE RED LIGHT IS ON.

HOW TO RESTART THE PROGRAM

IF THE PROGRAM "CRASHES" OR IF YOU ARE THE FIRST STUDENT USING THE COMPUTER THAT DAY, IT IS EASY TO START UP APPLEWORKS. FIRST, PLACE THE "START-UP" DISK IN THE DISK DRIVE AND THEN EITHER TURN ON THE COMPUTER OR IF IT'S ALREADY ON, PRESS CONTROL-OPEN APPLE-RESET. WHEN THE PROMPT AT THE BOTTOM OF THE SCREEN TELLS YOU TO, PLACE THE "PROGRAM" DISK IN THE DRIVE AND PRESS RETURN. TYPE IN TODAY'S DATE AND PRESS RETURN.

QUIZ ON USING APPLEWORKS

1. HOW DO YOU RETURN TO THE MAIN MENU OF APPLEWORKS?
_____

2. FROM THE MAIN MENU, WHAT CHOICES WILL ENABLE YOU TO GET A FILE FROM A DISK? NUMBER THE CORRECT CHOICES IN ORDER AS YOU WILL USE THEM.
_____ #1 "FROM THE CURRENT DISK: DRIVE 1"
_____ #1 "ADD FILES TO DESKTOP"
_____ #3 "MAKE A NEW FILE FOR THE WORD PROCESSOR"
_____ #2 "WORK WITH FILE ON DESKTOP"
_____ MOVE THE CURSOR TO HIGHLIGHT THE FILE YOU WANT AND PRESS RETURN

3 a) TO PREVENT CONFUSION IN SAVING FILES, YOU MUST RENAME SAMPLE FILES BY PRESSING THE OPEN-APPLE KEY AND WHICH LETTER? _____

b) YOU WILL THEN INSERT YOUR INITIALS AND CLASS PERIOD AT THE BEGINNING OF THE FILE NAME AND PRESS WHAT KEY? _____

4. FROM THE MAIN MENU, WHAT CHOICES WILL ENABLE YOU TO BEGIN WORK ON A COMPLETELY NEW IDEA? NUMBER THE CORRECT CHOICES IN THE ORDER OF USE.
_____ #1 "FROM THE CURRENT DISK: DRIVE 1"
_____ #1 "ADD FILES TO DESKTOP"
_____ TYPE A TITLE (STARTING WITH YOUR INITIALS AND CLASS PERIOD) AND PRESS RETURN.
_____ #3 "MAKE A NEW FILE FOR THE WORD PROCESSOR"
_____ #2 "WORK WITH FILE ON DESKTOP"
_____ MOVE THE CURSOR TO HIGHLIGHT THE FILE YOU WANT AND PRESS RETURN
_____ "FROM SCRATCH"

5. THERE ARE TWO WAYS TO DELETE ERRORS.

1) THE "DELETE" KEY DELETES THE CHARACTER TO ITS _____.

2) "OPEN-APPLE-D" WORKS FOR LONGER PIECES OF TEXT IF YOU FOLLOW THE PROMPTS AT THE _____ OF THE SCREEN.

6. WHAT COMMAND ENABLES YOU TO MOVE MATERIAL TO ANOTHER PART OF THE DOCUMENT, TO TRY NEW WAYS OF ARRANGING THE MATERIAL? _____

7. WHAT COMMAND ALLOWS YOU TO MAKE A COPY OF ALL OR PART OF YOUR DOCUMENT AND PLACE IT ELSEWHERE IN THE DOCUMENT, OR EVEN INTO ANOTHER DOCUMENT?

8. WHEN USING THESE COMMANDS, PROMPTS AT THE BOTTOM OF THE ____ TELL YOU HOW TO COMPLETE THE ACTION.

9. YOU SHOULD SAVE YOUR WORK FREQUENTLY TO AVOID LOSING IT IN CASE OF POWER FAILURE OR OTHER DISASTERS. WHAT STEPS WILL ENABLE YOU TO SAVE YOUR WORK ON A FLOPPY DISK? NUMBER THE CORRECT CHOICES IN ORDER AS YOU WILL USE THEM.

____ #1 "FROM THE CURRENT DISK: DRIVE 1"
____ #1 "ADD FILES TO DESKTOP"
____ #3 "SAVE DESKTOP FILES TO DISK"
____ #3 "MAKE A NEW FILE FOR THE WORD PROCESSOR"
____ #2 "WORK WITH FILE ON DESKTOP"
____ MOVE THE CURSOR TO HIGHLIGHT THE FILE YOU WANT AND PRESS RETURN
____ "FROM SCRATCH"
____ HIT "ESCAPE" TO REACH THE MAIN MENU,
____ FOLLOW THE INSTRUCTIONS AT THE BOTTOM OF THE SCREEN REGARDING WHICH DISKS TO INSERT WHEN.
____ #4 "REMOVE FILES FROM DESKTOP"

10. THE QUICK COMMAND FOR SAVING IS "OPEN-APPLE___." THE QUICK COMMAND FOR PRINTING IS "OPEN-APPLE __."

11. WHEN YOU TYPE A COMMA (,) PUT __ SPACE AFTER IT. WHEN YOU TYPE A PERIOD (.) PUT ___ SPACES AFTER IT.
AT THE END OF PARAGRAPHS, HIT _____.

12. WHEN DO YOU USE THE "RETURN" KEY? (choose one or more)
___ a) AT THE END OF EVERY LINE OF TYPING IN A PARAGRAPH
___ b) AT THE END OF EVERY PARAGRAPH
___ c) AT THE END OF EVERY LINE OF POETRY

13. WHICH COMMAND WILL LET YOU RETURN TO THE FILE YOU WERE WORKING ON IF YOU ACCIDENTALLY HIT THE "ESCAPE" BUTTON?

____ #1 "FROM THE CURRENT DISK: DRIVE 1"
____ #1 "ADD FILES TO DESKTOP"
____ "ESCAPE"
____ #3 "MAKE A NEW FILE FOR THE WORD PROCESSOR"
____ #2 "WORK WITH FILE ON DESKTOP"
____ MOVE THE CURSOR TO HIGHLIGHT THE FILE YOU WANT AND PRESS RETURN

14. WHAT STEPS TO YOU USE TO PRINT A COPY OF YOUR WRITING ON PAPER? (NUMBER THE STEPS YOU WILL USE IN THE ORDER IN WHICH YOU WILL USE THEM).

____ #1 "FROM THE CURRENT DISK: DRIVE 1"
____ #1 "ADD FILES TO DESKTOP"
____ "ESCAPE"
____ #4 "REMOVE FILES FROM DESKTOP"
____ PRESS "OPEN APPLE-P" TO PRINT THE DOCUMENT
____ #3 "MAKE A NEW FILE FOR THE WORD PROCESSOR"
____ #2 "WORK WITH FILE ON DESKTOP"
____ MOVE THE CURSOR TO HIGHLIGHT THE FILE YOU WANT AND PRESS RETURN
____ TAKE YOUR DATA DISK TO THE COMPUTER THAT HAS A PRINTER
___ SAVE YOUR FILE TO THE DATA DISK
____ FOLLOW THE PROMPTS TO SELECT PRINTER AND NUMBER OF COPIES (ONE ONLY)

15. WHICH BUTTON SHOULD YOU NEVER HIT WHILE USING THE APPLEWORKS PROGRAM? _____

16. WHEN YOU REACH THE END OF OF LINE, WHAT DO YOU HAVE TO DO TO GET TO THE NEXT LINE?

_____

17. IF YOU WISH TO CENTER A TITLE, WHAT STEPS DO YOU TAKE?

___ PRESS "ESCAPE"
___ SPACE TO THE CENTER OF THE SCREEN
___ USE "OPEN-APPLE-O" TO GET TO THE PRINTING OPTIONS MENU
___ TYPE "CN" AND PRESS "RETURN"

18. THE PRINTING OPTIONS MENU WILL ALSO ALLOW YOU TO DO WHICH OF THE FOLLOWING?

___ CHANGE THE SIZE OF THE MARGINS AND LETTERS
___ RETRIEVE A LOST FILE IN CASE POWER FAILS
___ RETURN TO REGULAR TYPING BY TYPING "UJ"
___ UNDERLINE TEXT
___ CHANGE ALL THE CAPITALS TO LOWER CASE

19. IF YOU HAVE TO START UP THE APPLEWORKS PROGRAM, WHAT IS THE DISK YOU PUT IN BEFORE TURNING ON THE COMPUTER? _____

20. OUTLINE SOME OF THE REQUIREMENTS FOR CARE OF DISKS. _____

APPENDIX C

Writing Activities from Student Sample Files

Schedule of Activities

Week One: Preposition Poem
Week Two: Participial and Prepositional Phrases
Week Three: Biopoem
Week Four: Diamante Poem
Week Five: Spelling Lesson and Pundemonium
Week Six: Sentence Combining
Week Seven: Description of Object (no sample file)
Week Eight: Description of Person (no sample file)
Week Nine: I Am Poem
Week Ten: Jabberwocky

Procedures for Beginning Work

This heading appeared at the beginning of every sample file, to assure that the students properly renamed and titled their work.

. . . . . .

Remember to re-name file (Open-apple-N; insert your initials and class period).

Name __ Period __

Type your name between the _ marks, and be careful not to erase them, as they begin and end the underlining. If you do need to replace them, use "Control-L."

. . . . . .

Preposition Poem

A SERIES OF PREPOSITIONAL PHRASES LEAD UP TO A MAIN IDEA OR MAIN CHARACTER.

In the Outer Reach,
On an island,
Under the hill,
In a cave,
With his stolen treasure,
In an assumed form,
Lay the dragon.

From the Archipelago,
In a small boat,
Without any company,
On a mission,
After the dragon,
With an evil secret,
Came the arrogant Mage.

In the meadow,
In the fresh air,
Without books or tablets,
Amid the children and sheep,
In complete innocence,
Palani taught school.

On the hillside,
Near the battle,
In terror and awe,
With sudden understanding,
In certain knowledge of what would come,
Bert raced to save Palani.

BIOPOEM

Instructions: Write your own "Biopoem" by completing the lines of the following. You may erase the directions in parentheses by using "Open-apple-D" and following the directions at the bottom of the screen to delete.

LINE #1	YOUR FIRST NAME ONLY
LINE #2	FOUR TRAITS THAT DESCRIBE YOU
LINE #3	SIBLING (SISTER/BROTHER) OF (OR SON/DAUGHTER OF)
LINE #4	LOVER OF . . . (3 PEOPLE OR IDEAS)
LINE #5	WHO FEELS ... (3 ITEMS)
LINE #6	WHO NEEDS ... (3 ITEMS)
LINE #7	WHO GIVES... (3 ITEMS)
LINE #8	WHO FEARS... (3 ITEMS)
LINE #9	WHO WOULD LIKE TO SEE... (3 ITEMS)
LINE #10	RESIDENT OF (CITY); (STREET OR ROAD)
LINE #11	YOUR LAST NAME ONLY

<u>EXAMPLE</u>

MARY
Caring, intelligent, warm, and funny,
Daughter of Verna and John,
Lover of my niece, reading, and my students,
Who feels happy, proud, and creative when teaching goes well,
Who needs time to read and reflect, friends to share ideas and fun, students to care about,
Who gives smiles, hugs, and sometimes, chocolate,
Who fears atomic war, the loss of caring in the world, and heights,
Who would like to see an end to hunger in the world, international peace and friendship, and the invention of the low-cal, nutritious hot fudge sundae,
Resident of Overland, Miriam Boulevard,
GARRETT.

DIAMANTE

This file uses the printer option "center."

NOUN
2 ADJECTIVES
3 PARTICIPLES
4 NOUNS (2 EACH FOR TOP AND BOTTOM NOUNS)
3 PARTICIPLES
2 ADJECTIVES
NOUN
(OPPOSITE)

READER
RECEPTIVE, OPEN
LOOKING, THINKING, VISUALIZING
LEARNER, CONSUMER, PRODUCER, TEACHER
REFLECTING, RECORDING, SHARING
CREATIVE, DISCIPLINED,
WRITER

PLAYER,
SWIFT, AGILE,
RUNNING, HUSTLING, COMPETING,
PRIDE, FULFILLMENT,NUMBNESS, DISSATISFACTION,
SITTING, WATCHING, YAWNING,
LAZY MOTIONLESS
SPECTATOR.

EXCERPTS FROM PUNDEMONIUM

WORDS TO CHOOSE FROM:

alter	materialistic	sell
barrel	meteor	shady
capsizes	mist	short iron
cleaners	money	spigot
date	newspaper	staggering
dedicated	paradox	stirrup
disguise	patients	stuffed
elicit	pear	subs
float	peas	sundae
full	petal	tie
green	press	to pay
hats	reserves	to spend
lightheaded	sand wedge	unbelievable
manors	scoop	unscrupulous

EXAMPLE:
Under stress a good doctor will not lose his patients.

1. People who work in the garment industry tend to be _____.
2. The activities director at a Colorado resort tried to _____ some interest in horseback riding.
3. There are vendors in front of the train station every night who try to _____ flowers.
4. In recent years some respectable-looking passengers on international flights have turned out to be terrorists in _____.
5. As soon as a gold digger "spots" a wealthy man, she's ready to take him to the _____.
6. The coach told his talented, 150-pound running back that before he could become a star, he first had to become a little _____.
7. The word "_____" could be defined as two medical practitioners.
8. Never go sailing with a haberdasher; all they talk about is _____.
9. During recent labor negotiations, the president of the tailor's union tried to get a lot of _____ coverage.
10. Two silkworms were once having a race. However, they ended up in a _____.
11. A dense fog in our area is causing a number of accidents on the highway. When the fog clears, it won't be _____.

12. If I can't find someone to buy a boat with me, I'll have to _____ a loan.
13. I saw some statistics recently on the growing number of alcoholics in this country. The figures are _____.
14. A gift shop has a sign under its toy animal display that reads: "Don't feed the animals. They're already _____."
15. When a torrential rain submerged the playing field with water, the coach sent in his _____.
16. There are a lot of _____ characters in the lamp manufacturing business.
17. Coal miners who wear illuminated helmets do not have to drink hard liquor to get high. They're already _____.
18. A few years ago the oil exporting countries had the United States and western Europe over a _____.
19. Any man who wants to wear a natural-looking, well-fitted hairpiece will have _____ a lot of money for it.
20. A golfer who gets hungry while playing 18 holes will always carry a _____ in his bag.
21. A person who drives an ice cream truck on weekends might be called a _____ driver.
22. Many reporters start out working in ice cream parlors to learn how to get the _____.
23. Most people do not realize that Adam never had a _____ with Eve -- only an apple.
24. A social climbing American pursued and married a wealthy English duke. She loves him for his _____.
25. Around Christmas time, vegetarians send each other cards that read: "_____ on Earth."

SENTENCE COMBINING

A. Susanna loves asparagus.
She loves asparagus cooked until it is very tender.
She can't stand spinach.
She can't stand spinach in any form.

B. Vandalism is on the rise at school.
Now the senior class is determined to stop vandalism.

C. Few hotel lobbies now have spittoons.
Not many people chew tobacco anymore.

D. The chef had a big knife.
The knife bit through the meat.
The meat was red.
The meat was juicy.
The meat was succulent.
The meat was a cut of beef.

E. A rock band makes a loud noise.
The noise can be more than 90 decibels.
Exposure to 90 decibels of noise can cause damage.
The damage is to one's hearing.
Rock music is popular.
Its popularity is greater than ever.

F. His attention wanders.
His eyes glaze.
He hums to himself.
He grins like a well-fed seal.
He is in love.

G. Needlepoint is an old craft.
Needlepoint is coming into vogue again.

H. You can legally operate a motorcycle.
You must first pass a test.

I. The gymnast bounds into the air.
He grasps the high bar.
He swings in a fluid loop.

I AM POEM

Instructions: Write your own "I Am" poem by completing the lines of the following. You may erase the directions in parentheses by using "Open-apple-D" and following the directions at the bottom of the screen to delete. You can repeat the first line by using "Open-apple-C" (for copy).

I am (two special characteristics you have).
I wonder (something you are actually curious about).
I hear (an imaginary sound).
I see (an imaginary sight).
I want (an actual desire).
I am (the first line of the poem repeated).

I pretend (something you pretend to do).
I feel (a feeling about something imaginary).
I touch (an imaginary touch).
I worry (something that really bothers you).
I cry (something that makes you very sad).
I am (the first line of the poem repeated).

I understand (something you know is true).
I say (something you believe in).
I dream (something you actually dream about).
I try (something you really make an effort about).
I hope (something you actually hope for).
I am (the first line of the poem repeated).

JABBERWOCKY EXERCISE

(Och! Help, please! Some fiend has not only mixed up the stanzas, title, and author's name of this poem, he (or she) has also deleted the last stanza completely. Use the "Open Apple-M" command to rearrange the lines, and the "Open Apple-C" command make a copy of the first stanza to replace the last.

Wockerjabby by Carroll Lewis

So rested he by the Tumtum tree,
O frabjous day! Callooh! Callay!"
And, as in uffish thought he stood,
Long time the manxome foe he sought--
Came whiffling through the tulgey wood,

"And hast thou slain the Jabberwock?
The Jabberwock, with eyes of flame,
And burbled as it came!

One, two! One, two! And through and through
Come to my arms, my beamish boy!
He chortled in his joy.
And stood awhile in thought.

Beware the Jubjub bird, and shun
The vorpal blade went snicker-snack!
All mimsy were the borogoves.
And the mome raths outgrabe.

He left it dead, and with its head
He went galumphing back.

'Twas brillig and the slithy toves
"Beware the Jabberwock, my son:
The jaws that bite, the claws that catch!
The frumious Bandersnatch!"

He took his vorpal sword in hand;
Did gyre and gimble in the wabe;

EXCUSES

Use your initials to begin the words of the excuse. Use the delete key to change these into your own set of excuses, using your own initials).

Mary Garrett
was late because the car was stuck in My Garage.
couldn't wash because she was Making Gingerbread.
didn't answer because her typewriter was Mossy and Gummy.
couldn't do her homework because a Mouse Growled at her.
wouldn't clean her room because she likes it Messy and full of Garbage.

Joy Kinder
was late because she was Just Kidnapped.
couldn't wash because the soap was Just Kidnapped.
didn't answer because she was busy Joking with the Kinders.
couldn't do her homework because she was Jogging and Kicking.
wouldn't clean her room because she was making Jello in the Kitchen.

ABC SENTENCES

WRITE A SENTENCE IN WHICH THE FIRST WORD BEGINS WITH A, THE SECOND WITH B, ETC.
(VARIATION: WRITE A STORY WITH THE FIRST SENTENCE BEGINNING WITH A, THE SECOND WITH B, ETC.

EXAMPLES

AFTER BREAKFAST, CARRIE DUMPED THE EGGS FLORENTINE IN THE GARBAGE. HARRY INJURED JACK KLINE'S LEG MISTAKENLY; NOW OPAL PACY QUESTIONS REGULATED SOFTBALL. TARYN UNDERSTANDS VERY WELL ABOUT XAVIER THE YOUNG ZEBRA.

ALICE BEDFORD CAUGHT CARL DEICHS, ED FISHER, GARY HOLMES, AND INGRID JENKENS KICKING LITTLE MONROE'S OLD PIG, QUEEN RUFUS STANFORD, TOWARD ULYSSES VOATE'S WEIRD YARD.

ARTIE BALLARTE CHEWS DIMES, EATS FROGS, GOES HOME, INJURES JOEY, KILLS LOUIS, MURDERS NANCY, OPENS PRESENTS, QUITS RUNNING, STOPS TALKING, UNDERSTANDS VERBS, AND WATCHES X-RAYS AND YELLOW ZEBRAS. (ed. note: Isn't anyone going to do something about this dangerous creature?)

MAD LIBS

GEORGE WASHINGTON, THE FATHER OF OUR 1)_____ (noun), was a very 2)_____ (adjective) man. When George was a 3)_____ (adjective) boy, he took a 4)_____(noun) and chopped down his father's favorite cherry 5)_____(noun).

"6)_____!" (an exclamation) said his father. "Who has 7)_____ (past participle verb) my 8)_____?" (noun)

Then he saw George holding a sharp 9)_____(noun) in his hand.

"Father," said George. "I cannot tell a lie. I did it with my little 10)_____."(noun).

His father smiled and patted young George on the 11)____(noun). "You are a very honest 12)_____(noun)," he said, "and some day you may become the first 13)_____(noun) of the United States."

ABRAHAM LINCOLN, was 1)_____(noun) of the 2)_____(adjective) States during the 3)_____(adjective) War. Lincoln was a very 4)_____(adjective) man, which often made him feel awkward and 5)_____(adjective). He 6)____(verb,past tense) school when he could, but only spent about 7)_____(number) of months actually in school. He was primarily self-educated, 8)_____(present participle verb) borrowed books by the light of the 9)_____(noun). As a lawyer, Lincoln had strong values and dedication, and earned the nickname of "10)_____(adjective) Abe."

MAD (WOMEN'S) LIB The Women's Lib Movement is a great step forward for all 1)_____(plural noun). This movement includes 2)_____(adjective) girls, working women, and even female 3)_____(plural noun). We now call women "Ms." whereas in the old days, if women were married, we called them "4)_____"(plural noun) and if they were single, we called them "5)_____."(plural noun) This shows that females have finally achieved equality with 6)_____(plural noun). There is nothing a man can do that a woman can't do just as well. Women used to be nurses, secretaries, and 7)_____(adjective) homemakers. Today, women are lawyers, 8)_____(plural noun) drivers, and even 9)_____(adjective) 10)_____(plural noun). Very soon we may find that the President of the United States is a 11)_____(noun).

Appendix D

Results of Survey

on Student Attitudes toward Word Processing

Survey on Word Processing -- M. Garrett -- 1987

1. Had you ever used a word processor before this class?
   YES _____ 30.1%
   NO _____ 45.6%
   A LITTLE _____ 24.3%

2. Did you enjoy learning to use AppleWorks?
   YES _____ 78.5%
   NO _____ 5.2%
   NOT SURE _____ 16.3%

3. Do you think it is easier ___79.3%
   or harder ___19.3%
   to write using a computer (instead of paper and pencil or pen)? (not sure____1.5%)

4. Which do you think makes your final product <u>better</u>?
   Writing by hand? _____ 6.8%
   Using the computer? ____93.2%

5. Would you want to continue using the word processor on your own?
   YES _____67.6%
   NO _____ 7.4%
   NOT SURE _____25.0%

6. Would you like it better if there were one computer for each student?
   YES _____74.1%
   NO _____15.6%
   NOT SURE _____10.4%

7. DO YOU FEEL THAT LEARNING WORD PROCESSING WAS WORTH YOUR TIME?
   YES _____84.3%
   NO _____ 6.7%
   NOT SURE _____ 9.0%

8. WOULD YOU RECOMMEND WORD PROCESSING TO OTHER STUDENTS?
   YES _____86.2%
   NO _____ 7.7%
   NOT SURE _____ 6.2%

9. WHAT DO YOU LIKE BEST ABOUT WORD PROCESSING? (Top six answers): Easy, Fun, Looks better, Enjoy typing, Can change mistakes more easily, Break from "work"

10. WHAT DO YOU LIKE LEAST ABOUT WORD PROCESSING? (Top six responses): Typing, Commands too confusing or complicated, Changing disks, Sharing, Takes time, <u>Nothing</u>

Results of Survey of Student Attitudes on Using Word Processing

Completed 6/3/87

Class Period	1	2	3	5	7
Used word processing before	3	11	12	4	5
NO	11	12	8	17	8
A little	9	3	4	7	8
Enjoyed word processing	13	22	20	22	18
No	2	1	1	3	0
Not sure	8	3	3	3	2
Found W.P. easier than by hand	15	21	19	23	18
W.P. harder than writing by hand	7	5	5	5	2
Not sure	1	0	0	0	0
Final product is better by hand	2	1	0	2	2
Better by computer	21	24	23	26	18
Would continue w.p. on my own	10	19	19	18	15
No- would not continue	4	0	1	4	0
Not sure	10	6	4	7	5
Prefer not to share computers	19	16	19	19	14
No - prefer to share computers	2	6	1	6	5
Not sure	2	3	4	4	1
Learning w.p. was worth my time	16	24	22	21	18
No - not worth the time	3	0	1	3	1
Not sure	4	1	1	3	1
Would recommend w.p. to others	18	22	24	20	17
No	1	2	0	5	0
Not sure	4	0	0	3	1

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