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ABSTRACT

The interaction between student writers and word processors was the subject of a case study that assessed (1) how advanced high school students respond to learning word processing, (2) what immediate impact the machine has on the writing processes and strategies of students, and (3) whether the machine alters students' attitudes toward writing and, if so, how. Over a period of six weeks, the two subjects of the study, both high school juniors, were asked to respond to two survey instruments designed to reveal their writing processes and attitudes, to compose four essays using pen and paper at first and later the computer, and to write protocols after each writing session. These materials were then subjected to a variety of qualitative and quantitative analyses. The findings provide some insight into how two types of students--the planner and the reviser--might respond to a word processing composition course and show that (1) although students may enjoy working on a computer, their enjoyment of the technology does not necessarily mean they have changed their attitude toward writing; (2) because revisers and planners emphasize different stages of the writing process, a reviser may adapt more readily to composing on a computer; (3) viewing their written work on the screen does not, in itself, help students determine what to change or correct; and (4) the limitations of the computer screen and the software affect a writer's strategies. (Appendixes contain copies of the instruments used in the study.) (RBW)

Student Writers and Word Processors:

A Case Study

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Student Writers and Word Processors:

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Perhaps one of Man's most enduring traits is his search for better ways to do his tasks. Writing with a word processor is one way to do a task more efficiently--at least this is what we would like to believe. So we have word processors in business offices, homes, writers' workrooms, and even English classrooms.

Those of us who write on word processors know that we can revise and edit our work until it is flawless, at least in terms of surface errors. Those of us who teach composition realize that someday we will be teaching writing with word processors. Those of us who do both hope we have an edge.

As a composition instructor interested in teaching students to use this new technology, I wanted to know how students might react to writing on a word processor. More specifically, I wanted to answer the following questions:

1) How will advanced high school students respond to learning word processing?

2) What immediate impact will the machine have on the writing processes of students?

3) Will the machine alter students' attitudes toward writing? If so, how?

RELATED CASE STUDIES

When I tried to answer these questions by reading case studies, I discovered that much recent research focused on the revision techniques of college students. For example, John Bean's pilot study at Montana State University examined the revision strategies of four college freshmen. During the project, Bean "encouraged [students] to concentrate first on further discovery and development of ideas, then on design and focus for readers, and finally on refinement of style."[1] In addition, his subjects followed one procedure for all their papers. Each student wrote his/her first draft with pen and paper, typed the draft into the computer, made a print-out, planned revisions, entered those changes, made another print-out, and repeated the process until he/she was satisfied with the essay. In testimonies, students stated that they made more revisions than they would have with pen and paper because they were not burdened with recopying.[2]

In another study involving word processors and revision strategies, Richard Collier examined the number, complexity, and range of revisions completed by four female nursing students between the ages of nineteen and thirty-two. Unlike John Bean, Collier did not instruct his subjects in revision techniques. His subjects did, however, follow a procedure. Each Tuesday for six weeks the students gave him their hand-written essays, and on the following Friday, they revised their essays on the computer. Results were mixed. For

example, students increased the number and complexity of their revisions on the word processor, but they carried more surface mistakes from draft to draft and recognized and corrected fewer of them.[3] Collier concluded: "the writing habits and revision paradigms of most of my subjects failed to alter very noticeably when they switched to using the word processor, [but] the efficient employment of these strategies increased markedly."[4]

In a third study, Lillian Bridwell, Geoffrey Sirc, and Robert rooke examined the revision strategies of five business majors (between the ages of twenty-one and twenty-three) as they prepared assignments for a business writing class. The researchers found that although the writers made many errors while typing on a word processor, they often corrected their mistakes immediately. In addition, these students said they were able to pay attention to textual problems because they could see the text in a clean format. Lillian Bridwell and her colleagues concluded that how a student uses the computer to revise depends upon the way the writer relates to his task and the computer. Two of the five writers expanded revisions to larger units of their text, two worked to limit revisions, and one struggled to stay the same because she did not master the system.[5]

Although these studies offer insights into students' revision strategies on the word processor, they do not provide information on the whole writing process. However, a study

conducted by Lillian Bridwell, Parker Johnson, and Steven Brehe examined the writing processes of experienced writers as they composed on a computer. The eight subjects were graduate teaching associates between the ages of twenty-six and forty-two; all were published writers. Using descriptions of the subjects' writing rituals, the researchers classified the writers as discoverers (those who compose to find out what they know), executors (those who plan and then write), or combinations (those who do some of both). All subjects did four writing tasks, the first with pen and paper or typewriter and the others on a computer. Using key stroke analysis and interviews, the researchers concluded that the subjects were impressed with the editing features of the word processing program (Wordstar), that executors were the most satisfied with composing at the terminal while discoverers were the least satisfied, and that the most successful subjects used a combination of pen and paper and the computer. From the quality of the papers and the variety of techniques used, the researchers also concluded that a right method for writing does not exist.[6]

While these four studies examined the writing strategies of inexperienced college writers and experienced adults, I wanted to know how writing on a word processor would affect the attitudes and strategies of advanced high school students. Would they compose impromptu and assigned essays with equal efficiency? If they did not usually make major revisions,

would they begin to do so, given the powers of the processor? Would they correct most or all of their surface errors? Would they feel more at ease about writing?

CASE STUDY METHODS

I asked my American Culture students (college bound juniors) if any of them were interested in learning to use a word processor and able to give up at least ten study halls during a six-week period. Two students, a boy and a girl, volunteered.

To study the writing processes and attitudes of these two students, I had them respond to two surveys, compose four essays, and write protocols after each writing session. The two surveys--one given at the beginning and one given at the end--focused on the writing processes and attitudes of the volunteers. Survey #1 (See Appendix A) also asked about typing and computer experience. Following Survey #2 (See Appendix B), I interviewed each volunteer to clarify responses in both surveys.

Two of the four essays--identified as a pre- and a post-test--were impromptu essays based on a short passage about curiosity from "The Aims of Education" by Bertrand Russell (See Appendix C). During fifty-five minute sessions, the students composed the pre-test with pen and paper, but they composed the post-test directly on the computer. I gave the students the same passage and question for both impromptu

essays to determine if any specific problems arose as a result of composing on the computer.

The other two essays--identified as Topic #1 and Topic #2--were assigned essays based on literature the students had read and discussed in American Culture (See Appendix D). Because students in this course learn strategies for writing literature and history exams, I asked the students to prepare the assigned topics the way they usually prepare for essay exams when they know the question in advance. For Topic #1, the students wrote with pen and paper and then revised on the computer. However, for Topic #2, they composed and revised on the computer.

While the students were engaged in their writing tasks, I wrote observations on their behavior. When they finished each session, they responded to a series of questions on their writing processes, experiences, problems, and attitudes (See Appendix E).

Evaluation of the essays involved both qualitative and quantitative analysis. To evaluate the holistic quality of the essays, I asked three University of Wisconsin--Milwaukee staff members to rate all papers--identified only as tests or topics. These staff members are composition instructors and trained proficiency exam readers. Two of them have taught only college; one has taught both college and advanced high school students. To evaluate quantitative elements, I tabulated word counts, sentence lengths, and errors in spelling, punctuation, and sentence structure.

THE SUBJECTS: SURVEY #1

The two volunteers--Terri and Rick--are second semester juniors. In the first survey, they described their writing processes, attitudes toward writing, and experience with typing and computers.

Terri's planning strategies include jotting down ideas and notes or making sketchy outlines. She identified herself as a somewhat moderate planner and an extensive reviser, "moving whole sections of the essay around because the plan or outline doesn't work out." Terri also noted that she does little editing and proofreading because she dislikes fussing with external mechanics. However, she did claim to moderately enjoy writing.

On the other hand, Rick stated that he only tolerates writing even though teachers have told him that he writes well. Rick described himself as an extensive planner and a moderate reviser. When he prepares for an essay or an essay exam, he writes down the major points he wants to cover and adds brief notes under each of the main topics. While writing, he is concerned about making his ideas clear and selecting "intelligent" words. He usually does not make internal revisions, but concerns himself with clarity and word choice. Rick does not feel the need to do much proofreading.

Both Terri and Rick had taken typing--Terri in summer school and Rick in a regular typing class. (Terri was concerned that she would fall behind Rick because he types

thirty-five words per minute, but after a short time on the word processor, she was typing adequately.) While Terri had worked with a computer in math, neither student had any experience with word processing before this study.

STUDENTS' WRITING ACTIVITIES

Activity A: The Pre-test

After responding to the survey, the students wrote an impromptu essay using pen and paper. To help them use the fifty-five minutes effectively, I suggested they allow about ten minutes at the beginning to read and plan and about ten minutes at the end to re-read, edit, and proofread.

Both students began the pre-test by reading the passage and question in approximately three minutes. Rick recorded that he planned for five to seven minutes while Terri wrote that she planned for only two to three minutes.

To organize his answer, Rick listed the topics he wanted to discuss and then added some notes under each major point. While composing his essay, he tried to follow his major ideas and to make his essay "sound intelligent." He spent the last five minutes re-reading and correcting his essay. When Rick finished, he put down his pen and smiled with satisfaction, suggesting that he had conquered the situation.

Terri did not end her pre-test with such satisfaction. She seemed glad to quit and said, "I guess I'm done." To plan

her answer, Terri had jotted down potential ideas and their branches. She described her composing as "writing off the top of my head" and said that she had spent "very little" time correcting the essay. That Terri had difficulty relating to the topic and that she disliked the essay was obvious both from her behavior and her comments. From the time she finished reading the passage and the question until she put her pen down, Terri was restless, watching the clock and shifting in her seat. She could not seem to concentrate and often showed signs of uneasiness through her facial expressions. What, I wondered, would be her reaction to the rest of the project?

Activity B: Topic #1

Topic #1, based on Upton Sinclair's The Jungle, was assigned to all students in American Culture as an in-class essay exam. I asked Terri and Rick to prepare for Topic #1 the way they usually prepare for essay exams when they know the question in advance.

During American Culture class, Rick and Terri used pen and paper to write essays on Topic #1. Both students responded to this activity as they usually respond to writing essay exams. Each had spent about an hour gathering information and planning his/her essay. Rick wrote as steadily as he normally does and as he did during the pre-test. Although Terri paused a few times and looked about, she

was not restless as she had been during the pre-test. She seemed comfortable in the normal classroom setting.

Immediately after class that day, they had their first experience with word processing. Using The Bank Street Writer on the Apple IIe, they learned how to boot the program, to enter a paragraph and make corrections, to save a file, and to quit. After they typed in the introductory paragraph of their hand-written essays, they corrected errors. Both students learned the commands quickly and moved through the modes without much difficulty. Rick finished entering his essay during this session, but Terri finished later in the week. At the end of the session, I printed copies for them so they could plan for revisions. Both reported that they liked working with the computer because it was so easy to correct errors.

During the next session, both students clarified information in their essays, added and deleted words, corrected errors, and printed their final copies.

For Topic #1, Rick spent a total of three hours planning, hand-writing, typing, revising and printing his essay. He stated that the computer gradually became easier to use and that he liked being able to move sentences and words and to correct mechanical errors so quickly.

Terri spent approximately five hours on Topic #1. Most of this time--nearly four hours--involved typing and revising. She kept forgetting how to shift between modes, but she

learned by trial and error. Although Terri did not record her attitudes, she verbally indicated that working with the computer was "interesting"--her word for fun.

Activity C: Topic #2

Topic #2, Hemingway's use of symbolism in "Big, Two-Hearted River," was assigned to the whole class as an essay exam question. However, Terri and Rick did not write this essay with the rest of the class. Instead, they composed directly on the computer. Although both students tried to complete the first draft within one session, they did not finish. At the end of this session, Rick commented that composing on the computer was not quite as difficult as he thought it would be. Terri, however, found the situation frustrating because she had "to think of the essay and type." Since the students did not finish their drafts for Topic #2 during that session, I asked them to complete their drafts on the computer sometime during the week.

The next two sessions were twenty minutes shorter than usual; consequently, Terri and Rick used both sessions to revise drafts and print final copies. At the first of these two sessions, Rick attempted to revise his essay using only the computer and not a print-out of his rough draft. (He did this at my request.) Rick reported that it was not too difficult to move paragraphs or sentences around in order to clarify his meaning, but that it was difficult to find errors:

"For some reason I miss grammatical errors on the screen." Following this session, he took a print-out with him so that he could plan for further revisions and corrections. He completed and printed his paper during the final session. For Topic #2, Rick worked approximately two and one half hours; twenty minutes of that time was for planning prior to composing the first draft.

Using a print-out of her first draft, Terri also revised content, corrected some errors, and printed her final copy during these two short sessions. Following the first of these two sessions, she wrote that the limited screen did not seem to be a problem for composing and revising. However, one week later she reported that trying to rewrite the conclusion was frustrating because she wanted to see the whole essay in its final form to revise the conclusion. She scrolled the screen often and asked for guidance in developing a clear and thoughtful conclusion. (In order to print a copy of her paper in its final stage, she would have had to move to another machine, but she did not.) For Topic #2, Terri worked about four hours; thirty minutes of that time was for planning before composing the first draft on the computer.

Activity D: The Post-Test

The final writing activity was a fifty-five minute impromptu essay based on the same passage and question as the first impromptu. However instead of using pen and paper to

write, the students composed their essays directly on the computer. I suggested that they spend the first seven to ten minutes reading and planning and the last ten minutes re-reading, editing, and proofreading. They did not print the final copies during that fifty-five minute period.

For both students, composing the post-test on the word processor was quite different from composing the pre-test with pen and paper. During the first five minutes, Rick read the passage and question and then planned his essay. However, he altered his planning strategy slightly. Instead of writing out his thesis and his major and minor points as he did for the pre-test, Rick wrote only the thesis and the major ideas he wanted to cover. He "left most of the supporting points for improvisation at the terminal."

During the post-test, Rick was frustrated. While he was composing, he made numerous typing errors and corrected them immediately. Watching the clock, he hurried to finish the piece and then scrolled through the essay adding and deleting words to improve the "sound" of phrases and sentences. Because he was hurrying, he frequently confused the modes and erased words by mistake. He concluded: "I think I write things more the way I want them when not using a computer."

Terri, on the other hand, was much more relaxed at the computer. During the hand-written pre-test, she had been extremely restless, but during the post-test, she worked steadily, checking the clock infrequently. She spent the

first five minutes reading the passage and question and then writing brief notes. While composing, she continuously scrolled to re-read when she was blocked. At one point, she moved a paragraph inside another one and continued to compose. Terri found writing an impromptu on the computer to be much easier than writing with pen and paper because she could make changes so easily: "When you write something down, you don't have to worry about scribbling out or rewriting." She mentioned one disadvantage: the typing and changing of modes took time away from composing.

THE SUBJECTS: SURVEY #2

Both students provided additional insights through their responses to Survey #2. At the end of the project, Terri described her attitude toward writing as more positive than at the beginning. She liked writing on the word processor for two reasons. First, she did not worry about planning or about making mistakes because she could move material around easily and make corrections quickly. (However, Terri did not correct surface errors extensively.) Secondly, she was willing to compose more because she knew she could delete anything she did not want. She said, "I don't have to worry about the paper being an obstacle." Clearly, Terri is a reviser, not a planner. As a reviser, she easily adapted to composing on the computer.

For Rick, writing on the computer was harder than writing with pen and paper. He described his problems as twofold. When composing on the computer (especially for the impromptu essay), he had difficulty formulating his ideas. In addition, he could not judge the length of his essay; this prevented his knowing whether he had completed his topic. Given time, he felt he could learn to compose, revise, and edit on the computer without using printed drafts. For now, however, Rick sees a word processor as a tool to use for revising and editing rather than composing.

Working on a word processor did not affect Rick's writing processes or his attitudes to any great extent. Although he planned somewhat less when he knew he would be composing on the computer, he did not change his revising or editing strategies. However, he did increase his proofreading to check for surface errors. And even though he enjoyed learning to write on the computer, he said he still only tolerates writing because he never feels completely in control of the situation.

Both students said they would be interested in taking a composition course with word processors if the course focused on the kinds of papers they would be required to write for college classes. Rick said it would be especially appealing if he knew he would have access to a word processor at college.

EVALUATION AND RESULTS

What does this study reveal about the interaction of two advanced high school students and word processors? To answer this question, I had all papers rated qualitatively, and I examined them quantitatively.

Qualitative Analysis: Holistic Scoring

Three qualified readers judged the holistic quality of all the essays. Using a scale of 1 to 4 (4 being the highest), the readers rated the papers on responsiveness to the assigned topic, focus and development of a central idea, specific examples or details to substantiate the thesis, organization, appropriate sentence structure and diction, and absence of mechanical errors. The actual scores assigned to each essay do not differ more than one point. Table 1 shows the average score for each paper.

TABLE 1: Average Holistic Scores

	Pre-test	Post-test	Topic #1	Topic #2
Rick	2.3	2.2	3.0	4.0
Terri	1.3	2.0	2.3	2.3

Rick, who described himself as an extensive planner, received remarkably similar scores for his pre- and post-tests (impromptu essays). Although Rick sketched ideas for both essays before he composed them, he could not do the extensive

planning that usually precedes his writing. The similarity and the mid range of scores for the hand-written pre-test and the word processor post-test imply that the impromptu essay was a critical factor in affecting these scores and that composing on the computer did not help Rick write a better post-test.

Rick is more successful writing planned than impromptu essays. His holistic scores for the assigned papers--Topic #1 and Topic #2--are considerably higher than those for the impromptu papers. However, his Topic #1 essay does not reflect his careful attitude toward his work. About mid-way through the essay, he ran the paragraphs together as a result of mistakes in working with the enter/return key. He did not correct his mistakes. But by the time he completed Topic #2, he had overcome this problem with the computer. The holistic average for Topic #2 is representative of Rick's planned essays; in fact, he is an A student.

Terri, who described herself as an extensive reviser, showed a definite improvement in her overall average between the pen and paper pre-test and the word processor post-test. This improvement is due, in part, to her interaction with the word processor while composing. Because she could move text and add and delete words, phrases, and sentences, Terri exhibited much more concentration and control while writing on the word processor than while writing with pen and paper. As a result, she wrote a substantially better essay for the post-test than for the pre-test.

While Terri's post-test score is 0.7 higher than her pre-test score, the post-test score is only 0.3 lower than the scores for the assigned essays. The close range of her scores for the post-test and assigned essays implies that the computer was more influential than the type of essay in affecting Terri's scores.

However, another factor also influenced the holistic scores for all of Terri's essays. Although she does extensive internal revision, Terri does not like to correct spelling or punctuation mistakes (See Table 3). This inability to focus on errors and to correct them is partly responsible for the scores she receiveo.

Quantitative Analysis: Word and Error Counts

In addition to holistic scoring, I also wanted to know the comparative length of the essays and the number of sentences and words per sentence for each essay. These counts are listed in Table 2.

TABLE 2: Word Count

Part A: Number of Words Per Essay

	Pre-test	Post-test	Topic #1	Topic #2
Rick	396	288	658	443
Terri	347	386	786	513

Part B: Number of Sentences Per Essay

	Pre-test	Post-test	Topic #1	Topic #2
Rick	19	15	34	24
Terri	17	23	48	34

Part C:	Number of Words Per Sentence			
	Pre-test	Post-test	Topic #1	Topic #2
Rick	20.8	19.2	19.4	18.5
Terri	20.4	16.8	16.4	15.1

Comparing the number of words each student wrote for the pre- and post-tests suggests that each student's response to the work environment influenced how much he/she composed (See Table 2: Part A). Certainly Rick's frustration with impromptu composition on the computer is supported by the 27% decrease in the number of words he wrote during the post-test. In contrast, Terri increased the number of words by 11% between the pre- and post-tests. This supports her comment that she found it much easier to compose on the computer than with pen and paper.

Writing and revising on a word processor apparently affected each student's average sentence length (See Table 2: Part C). Rick and Terri wrote fewer words per sentence for all their computer-produced papers than for their hand-written pre-tests. The shortest average sentence length for both students occurred in their essays for Topic #2. Rick reduced his average sentence by 2.3 words while Terri reduced her average sentence by 5.3 words (a 25% reduction). This suggests that composing and revising on the computer may reduce a writer's average sentence length.

Since correcting errors is quite easy with a word processor, I wanted to examine what impact this might have on

students' external revision and proofreading. I selected spelling, punctuation, and sentence errors as those most likely to be corrected by advanced high school students before a final copy would be submitted to a teacher. Under spelling, I included all errors made with the apostrophe (for example, it's for its) and typing errors. For sentence errors, I counted only fragments and run-on sentences. I did not count awkwardly worded statements as errors. The results are listed in Table 3 and Table 4.

TABLE 3: Actual Errors

	Pre-test	Post-test	Topic #1	Topic #2
Rick				
Spelling	0	1	3	1
Punctuation	5	1	2	1
Sentence structure	0	0	0	0
Terri				
Spelling	14	18	16	13
Punctuation	7	6	9	5
Sentence structure	0	0	2	1

TABLE 4: Errors Per 50 Words

	Pre-test	Post-test	Topic #1	Topic #2
Rick				
Spelling	0.00	0.17	0.23	0.11
Punctuation	0.63	0.17	0.15	0.11
Sentence structure	0.00	0.00	0.00	0.00
Terri				
Spelling	2.02	2.33	1.01	1.27
Punctuation	1.01	0.77	0.57	0.49
Sentence structure	0.00	0.00	0.13	0.10

Numbers of errors simply confirm the students' remarks about themselves as writers. Rick attempts to correct his mistakes while Terri dislikes proofreading and avoids correcting external errors. For example, Rick made 2 to 5 actual errors per paper (See Table 3); this means he made only a fraction of an error per 50 words (See Table 4). Terri, however, made from 19 to 27 actual errors per paper or from 1.71 to 3.03 errors per 50 words. Even when I pointed out spelling mistakes to Terri, she did not make corrections. When I asked Terri why she did not correct mistakes when it was so easy with the word processor, she said she found proofreading tedious.

SUMMARY AND INTERPRETATION OF RESULTS

Although a student may enjoy working on a computer, his enjoyment of the technology does not necessarily mean that he has changed his attitude toward writing. Rick liked learning to use the word processor, but he still only tolerates writing. In an interview, Rick explained that when he writes, he wants to control the variables--content, organization, development, diction, and correctness. But contrary to Colette Daiute's statement that "computer users tend to feel in control of the writing process,"[7] Rick felt as if he had less control when composing on a computer than when hand-writing.

Because revisers and planners emphasize different stages of the writing process, a reviser may adapt more readily to composing on a computer. Unlike the experienced planners in the Bridwell, Johnson, and Brehe study,[8] Rick did not adapt easily to composing on a word processor. When Rick planned his essay (Topic #2), he had few problems while composing on the computer. However, when Rick wrote the impromptu essay on the word processor, he had some difficulty generating and shaping his ideas. Terri, on the other hand, gradually adapted to composing on the computer. During the first session for Topic #2, Terri had difficulty typing and thinking of ideas at the same time, but by the end of the study, she easily interacted with the computer as she composed the impromptu post-test. In addition, she composed more because she could delete easily. Perhaps a reviser will progress more rapidly as a writer if she/he composes on a word processor. On the contrary, a planner who tries to compose without his usual notes may regress since he is using a new strategy--composing with little or no planning.

Viewing their written work on the screen does not, in itself, help students determine what to change or correct. Rick stated that he missed surface errors when looking at the screen and that he needed a hard copy to see his mistakes. And Terri, as the error analysis shows, did not correct her errors just because she had a neat copy on the screen. In fact, even after I pointed out spelling mistakes and offered

Terri a dictionary, she still did not correct surface errors. Not everyone uses the tools she/he is given.

The limitations of the computer screen and the software affect a writer's strategies. When Terri was composing and revising Topic #2, she commented on the limited screen. While it did not seem to create a problem at first, she found that revising the conclusion was difficult because she had changed the content of the essay and had not made another hard copy. Therefore, she had to scroll and re-read to know how to revise her conclusion. She tried to avoid the pitfall of "localized revision."[9]

During the interviews, both students commented on the 40-column screen used by The Bank Street Writer on the Apple IIe. They discussed their inability to see exactly how a page looks before it is printed and related this limitation to their paragraphing errors in the essays for Topic #1. In addition, Rick commented that knowing what page he is on helps him to determine whether he has covered his topic adequately. This was a problem for him when he composed the post-test. The software's sophistication (or lack of it) does affect a student's writing.

RECOMMENDATIONS

What insight does this study offer instructors who are preparing to teach composition with word processors? And what questions still need to be answered?

Teachers should identify students' writing processes and attitudes by having students complete surveys at the beginning of the course.

By understanding individual writing processes, teachers can allow for various interactions with the computer. For example, some students may prefer to compose with pen and paper and use the word processor to revise while other students may want to compose and revise on the computer.

Instructors will have to teach revision, editing, and proofreading; students do not automatically revise or correct errors simply because they have a new tool at their disposal.

Teachers should select a word processing program that meets the needs of their students[10] and other software that will enhance the word processing program. For example, a spelling checker can help students recognize and reduce their errors. When he was teaching technical writing at the University of California at Santa Cruz, William Van Pelt found that students who used SPELL (one program from Writer's Workbench) gradually improved their spelling. He reports: "the immediate feedback of the SPELL program helped students realize that they habitually misspelled the same words and they began to catch these errors during the composition process itself, gradually lessening their dependence on the SPELL program."[11]

Finally, teachers and researchers will need to continue their search to understand the interaction of students and

word processors. What, if anything, will happen to students' writing as a result of composing on a 40-column screen as opposed to an 80-column screen? To what extent will the sophistication of the word processing program and the other software used with it influence the writing processes of students? Why do students miss errors on the screen? Different visual demands are required when writing with pen and paper and when writing on a computer. Patricia Carlson, who has done research in this area, says, "a switch of this type requires changes in habits of perception."[12] Does this need for different ways of viewing words have an impact on proofreading? Hopefully, these questions will be answered through future research.

This is not a scientific analysis of students and word processors. It does, however, provide some insight into how two types of students--the planner and the reviser--might respond to a word processing composition course. Certainly, surveys will help teachers and students understand individual writing processes and will help teachers make allowances for individual differences. Perhaps by creating an exploratory atmosphere in the classroom, teachers can encourage students to learn more about their processes of writing. The value of a word processor equals a student's ability to use it to become a better writer.

Appendix A

Survey #1

Name:_____
Class Rank: Jr.

Please answer each question by writing a brief but clear statement or by circling your choice, as indicated.

Writing Process:

(Plan means to think, take notes, or outline; revise means to alter the content or meaning; edit means to replace words and correct errors.)

1. Briefly describe what you do during each of the writing stages:

   a. Planning:

   b. Writing:

   c. Revising:

   d. Editing:

   e. Proofreading:

2. How much do you like to write?	Enjoy	Moderately Enjoy	Tolerate	Dislike
3. To what extent do you plan assigned essays?	Extensively	Moderately	Somewhat	Not at all
4. To what extent do you revise?	Extensively	Moderately	Somewhat	Not at all
5. To what extent do you edit?	Extensively	Moderately	Somewhat	Not at all
6. To what extent do you proofread the final copy?	Extensively	Moderately	Somewhat	Not at all

Word Processing:

1. Do you know how to type? Yes No

   If yes, state wpm: ____

2. Have you ever used a microcomputer? Yes No

   If yes, state extent: Extensively Moderately Infrequently

3. Have you ever done word processing? Yes No

   If yes, state extent: Extensively Moderately Infrequently

4. How difficult will it be to learn to use the computer? Extremely difficult Moderately difficult Easy

5. How difficult will it be to learn word processing(wp)? Extremely difficult Moderately difficult Easy

6. How will wp affect planning an essay? Make it hard Make it easy Have no idea

7. How will wp affect writing an essay? Make it hard Make it easy Have no idea

8. How will wp affect revising an essay? Make it hard Make it easy Have no idea

9. How will wp affect editing an essay? Make it hard Make it easy Have no idea

10. If you would like to add any other comments about your writing experience, please do so.

Appendix B

Survey #2

Name:_____
Class Rank: Jr.

Please answer each question by circling your choice or by writing a brief but clear statement, as indicated.

The Writing Process and the Word Processor:

(The word revise means to alter the content or meaning; the word edit means to replace words and correct errors.)

1. To what extent did you plan the essay before working at the terminal? Extensively Moderately Somewhat Not at all

2. To what extent did you revise at the terminal? Extensively Moderately Somewhat Not at all

3. To what extent did you edit at the terminal? Extensively Moderately Somewhat Not at all

4. To what extent did you proofread before printing the final copy? Extensively Moderately Somewhat Not at all

5. Compared to writing with pen and paper, how did word processing affect each of the following:

   a. Planning Made it easier Made it harder Had no effect

   b. Writing Made it easier Made it harder Had no effect

   c. Revising Made it easier Made it harder Had no effect

   d. Editing Made it easier Made it harder Had no effect

   f. Proofreading Made it easier Made it harder Had no effect

6. Briefly comment on your choices in #5.

7. To what extent do you like writing with the word processor? Enjoy | Moderately enjoy | Tolerate | Dislike

8. Would you like to continue using a word processor? Yes No

Explain.

9. If you had an opportunity to take a semester course in composition and the word processor, would you? Yes No

Explain.

10. Add any other comments about your experience with writing and word processing.

Appendix C

Impromptu Essay
[Note that this was used for both the pre- and post-tests.]

Curiosity...is inspired by a genuine love of knowledge. You may see this impulse, in a moderately pure form, at work in a cat which has been brought to a strange room and proceeds to smell every corner and every piece of furniture. You will see it also in children, who are passionately interested when a drawer or cupboard, usually closed, is open for their inspection. Animals, machines, thunderstorms, and all forms of manual work arouse the curiosity of children, whose thirst for knowledge puts the most intelligent adult to shame. This impulse grows weaker with advancing years, until at last what is unfamiliar inspires only disgust, with no desire for a closer acquaintance. This is the stage at which people announce that the country is going to the dogs and that "things are not what they were in my young days." The thing which is not the same as it was in that far-off time is the speaker's curiosity. And with the death of curiosity we may reckon that active intelligence, also, has died.

from "The Aims of Education" by Bertrand Russell

Bertrand Russell defines curiosity as "a genuine love of knowledge." Using his definition and your own experiences as a student, explain how academic learning can be increased with an active curiosity and why high school students who want to attend college need curiosity in their intellectual lives.

Appendix D

Topic #1

Explain why Upton Sinclair's The Jungle is classified as a muckraking novel. Discuss specific examples of the social, industrial, and/or political conditions in Packingtown.

Topic #2

Explain how Hemingway used the following symbols in "Big, Two-Hearted River" to present the meaning of the story: the burned land, the islands of pines, the trout, the grasshoppers, and the swamp.

Appendix E

Protocol

Name:_____

Topic:_____
Date:_____

Answer each question as accurately and completely as possible.

1. How much time did you spend planning the essay?_____

2. What did you do (write notes, outline, etc.) as you planned?

3. Describe what you did (writing, reading, re-reading, revising, correcting, proofreading) while working at the machine.

4. Describe what you learned while working at the machine.

5. Describe any problems you had while working at the machine.

6. How much time did you spend writing/composing?_____

7. How much time did you spend revising/correcting?_____

8. Do you have any other comments?

[For the pre-test, students were asked to disregard the phrase "at the machine" when they answered questions 3, 4, and 5.]

Notes

[1] John Bean, "Computerized Word-Processing as an Aid to Revision," College Composition and Communication, 34, No. 2 (May 1983), p. 147.

[2] Bean, p. 148.

[3] Richard M. Collier, "The Word Processor and Revision Strategies," College Composition and Communication, 34, No. 2 (May 1983), pp. 151-152. See also Collier, The Influence of Computer-Based Text Editors on the Revision Strategies of Inexperienced Writers (ERIC ED 211 998).

[4] Collier, pp. 153-154.

[5] Lillian Bridwell, Geoffrey Sirc, and Robert Brooke, "Revising and Computing," unpublished paper, pp. 6-40; forthcoming in The Acquisition of Written Language: Revision and Response, ed. Sarah Freedman (Norwood, NJ: Ablex).

[6] Lillain Bridwell, Parker Johnson, and Stephen Brehe, "Composing and Computers: Case Studies of Experienced Writers," unpublished paper, pp. 8-36; forthcoming in Writing in Real Time: Modelling Production Processes, ed. Ann Matsuhashi (New York: Longman).

[7] Colette A. Daiute, "The Computer as Stylus and Audience," College Composition and Communication, 34, No.2 (May 1983), p. 142.

[8] Bridwell, Johnson, and Brehe, p. 33.

[9] William Van Pelt discusses students' concern with local rather than global revision in "Another Approach to Using Writer's Workbench Programs: Small Class Applications," in Sixth International Conference on Computers and the Humanities, ed. Sarah K. Burton and Douglas D. Short (Rockville, Maryland: Computer Science Press, 1983), p. 728.

[10] See Joan Hocking and Cheryl Visniesky, "Choosing a Microcomputer System: A Guide for English Instructors," College Composition and Communication, 34, No. 2 (May 1983), pp. 218-220.

[11] Van Pelt, p. 726.

[12] Patricia Ann Carlson, "Computers and the Composing Process: Some Observations and Implications," in Sixth International Conference on Computers and the Humanities, ed. Sarah K. Burton and Douglas D. Short (Rockville, Maryland: Computer Science Press, 1983), p. 75.