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The Effect of Computer Use on the Process Writing of Learning Disabled Students

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Abstract

The purpose of this study was to describe the effect of computer use on the process writing of primary aged learning disabled students. Children were randomly assigned to either an experimental group, who utilized wordprocessing for their process writing activities, or a control group, who utilized a traditional paper and pencil medium for their process writing activities. Results indicated significant improvement on the measured dependent variables of T-units, words in T-units, and gross words for both the experimental and control groups. Discussion emphasizes the importance of blending carefully planned instruction with wordprocessing and computer usage.

Computer technology is advancing rapidly, and it is now sometimes hard to imagine that it was little more than a decade ago that the first microcomputers came on the market. In this short span of years, the computer has quickly become a "wild card" in our schools, with the promise of tremendous potential, but with yet an unproven effect on many learning activities. Just as a "wild card" dealt in a card game must interact effectively with the rest of the cards dealt to the holder, so must the computer interact effectively with the rest of the educational variables in the learning environment. Educational computing

studies in general, have often been criticized for a tendency to isolate the computer from its interaction with the learning environment (Clark 1985; Clark 1986; Simonson and Thompson 1990). This isolation creates a focus on the effects of the computer itself, rather than on the effects of the computer when interacting with well planned instruction.

Wordprocessing is an especially appealing application of computer technology. The ability to neatly compose, edit, save, and print text would seem to be an impressive way to help children learn to write in school, especially children who appear to have difficulty with the traditional pencil and paper formulation of letters. But writing is much more involved than the mere formulation of letters and words, it is a complex process related to the formulation and communication of ideas. If wordprocessing can be used to improve the student writing process, then it must facilitate the generation and communication of student ideas.

Process writing instruction can be a particularly powerful tool to address the generation and communication of ideas. This type of instruction focuses on the various processes in which writers engage to produce their final product (Graves 1985; Graves and Hanson 1984). Most of these processes focus on idea generation, organization, and communication. Typically, this type of writing begins with a planning stage in which writers think of the possibilities of ideas they may want to include in their composition. This stage may also include planning the organization of these ideas. In the next stage of the writing process, the writer begins an initial draft. The following stage is the revision stage. During revision, the writer reconsiders ideas and how to present those ideas. If the writer sees a need to change ideas, add to them, or delete them, this occurs during the revision stage. Editing is the final stage of writing. During editing, the writer looks for needed corrections in such areas as grammar and spelling. Though these steps are presented here in sequence, the writer often goes back and forth between these steps in the writing process as needed.

The results related to the effectiveness of wordprocessing on student writing has been mixed (Hunter, Jardine, Rilstone, and Weisgerber 1990). Although some studies have indicated beneficial effects of wordprocessing (such as Branam 1984; Willer 1984; Hooper 1986; Willinsky 1990), many others have found no significant differences between wordprocessing, and the more traditional paper and pencil medium (Cross and Curey 1984; Hawisher 1987; Kurth 1987). However, most of the reported studies have not examined the effects of wordprocessing when it is paired with carefully planned writing instruction, focused on the generation and communication of student ideas.

For learning disabled students in particular, the potential of wordprocessing to facilitate the writing process may be especially appealing. Learning disabled children often have a difficult time just producing the written symbols needed to communicate their ideas with the needed letters and words. For many of them this is a laborious, unrewarding, and even frustrating, task which often interferes with the production of ideas in their writing (Wallace and McLoughlin 1988;

Graves 1985). It has been demonstrated that wordprocessing has the potential to eliminate this barrier to writing and provide an environment that may be more conducive to building and communicating ideas (Collins and Price 1986; Lerner 1985). However, learning disabled students, as with other students, may need to be instructed well beyond keyboarding or penmanship in order to have an expectation that their writing will improve. The complexity of the writing process demands that wordprocessing, as well as traditional paper and pencil methods, be carefully integrated into well planned writing instruction.

There is little doubt that wordprocessing can help learning disabled students with the often arduous task of producing symbols on paper, but whether wordprocessing actually improves the quality of what is communicated in the written work is still unclear. The effects of wordprocessing, when paired with writing instruction that is focused on the generation of ideas, rather than the physical mechanics of writing, are as of yet undetermined. To help investigate the use of wordprocessing as a tool for improving the writing process, this study investigated whether wordprocessing, when paired with carefully planned process writing instruction for learning disabled children, is any more effective in facilitating student idea generation than the traditional paper and pencil medium.

Subjects

The subjects participating in the study were 12 children admitted for participation in the University of Nebraska at Omaha Learning Disabilities Clinic. The children had been either formally diagnosed as learning disabled by their school district personnel, or were considered at risk of such a diagnosis. The mean age of the 6 girls randomly assigned to the experimental group was 7 years, 10 months, and the mean age of the 4 boys and 2 girls randomly assigned to the control group was 8 years, 2 months. The children of both groups were in the 1st through 3rd grades.

Methodology

The experimental group children used the wordprocessor, and the control group children used a traditional paper and pencil medium, during writing activities. The wordprocessing package used in the study was IBM's *Primary Editor Plus*. However, only the basic wordprocessing features of the software package were utilized. All children received carefully planned process writing instruction during each of 4 weeks of the research procedure, consisting of 16 days of writing instruction, approximately 45 minutes per day.

Process writing instruction between the groups was carefully controlled and equated, and consisted of a 4 day sequence of instruction for each study week. This cycle focused on process writing as a means to generate and communicate ideas. Each week consisted of a different story topic, and included topics such

as my favorite animal, and my favorite vacation. Activities over each of the 4 days, within each week were then used to facilitate student development of the week's topic. The planning stage was operationalized on the first day of the week (Day 1), by having students brainstorm about the topic while the teacher wrote their ideas on the chalkboard. The drafting stage followed on the next day (Day 2), as students began writing about the topic. They were provided with verbal and written reminders of their ideas from Day 1, and asked to write a story about the topic. Revision of ideas was facilitated through peer conferencing which began on the 3rd day of the week (Day 3). During the peer conferences, the students shared their stories with other students. The listener would then ask clarifying questions and make suggestions for ideas to be added. The students responded to these questions and then revised their stories based on the peer questions and suggestions. On the last day of the week (Day 4), the students made final revisions to their stories, drew pictures to illustrate their writing, and participated in a cut and paste publication activity. Following this activity all children were given a copy of the final publication. Both the experimental and control groups went through the same weekly cycle, with only the writing mediums differing.

All interactions between teachers and students in the study focused on facilitating the idea development of the students. The mechanical skills of writing, such as, spelling, grammar, and punctuation were not emphasized. Students were instead encouraged to address these skills as best they could, while considering their ideas as the most important part of their story. Thus the editing stage of writing was omitted in this study. During each day of the study, a total of four teachers, who were graduate students working on masters degrees in special education, worked with each group of students. These teachers were randomly assigned to treatment groups, and rotated weekly, making sure that each group had a different set of teachers each week, to help remove any possible negative or positive teacher effects in the study.

Other study controls were incorporated to ensure that both groups received the same process writing instruction. The study researchers trained the teachers in process writing procedures, monitored the daily progress of each group, and ensured that all instructional techniques between the groups were similar. The teachers were monitored carefully to ensure that they were not rushing or forcing students into the writing process. Students were continually encouraged to freely develop their own ideas. Also, both groups of students were exposed to keyboarding and wordprocessing prior to beginning the study to reduce any possible novelty effect.

Analysis and Results

Because this study focused on process writing, a time honored procedure for analyzing simple "minimal sentences," referred to as minimal terminable units, or T-units, was utilized (Hunt 1965). This procedure gave the researchers

maximum sensitivity to the ideas in each child's written product. The results of the study, therefore, consisted of collecting data on three dependent variables: T-units, words in T-units, and gross words. For the purpose of this study, T-units consisted of independent clauses plus dependent clauses. Words in T-units, consisted of a count of the words within the independent and dependent clauses only, while gross words consisted of a count of all composition words. For example, Figure 1 is a sample student process writing product and translation (Day 2) for a girl, age 8 years, 5 months, participating in the experimental group.

<u>Student Work:</u>	<u>Translation:</u>
MY NAME IS TONI	/My name is Toni./
I HAVE A STUOEE TO TELL YOU.	/I have a story to tell you./
I HAVE A DOG.	/I have a dog./
IS UPON A TIME A GHOST CAME INTO MY HUASE	/Once upon a time a ghost came into my house./
AND I WUS SKAED SO I WITT TO MY ROOM	/And I was scared so I went to my room./
BUT HE FOOLOED	/But he fooled./
BUT I HID.	/But I hid./
THE END	The End
I HAVE A CAT.	/I have a cat./
THE GHOST AND DONALD DUCK	The ghost and Donald Duck
DONALD DUCK WUS WOOSHING T.V WINA GHOST	/Donald Duck was watching T.V. with a ghost./
<p><i>T-units (as represented by words between slashes) = 9</i> <i>Words in T-units = 53</i> <i>Gross words = 60</i></p>	

Figure 1. Sample Process Writing Product

Subject compositions were collected and analyzed on Day 2 of each week of the study, prior to revision, and on Day 4 of each week of the study, following revision. This analysis of Day 2 and Day 4 compositions was completed for each subject during each of the four study weeks. Overall means for each variable were then computed for each subject, providing an individual overall mean for Day 2 and an individual overall mean for Day 4.

Individual overall means were then compared by group to determine if subjects within each treatment group had improved in their writing between Day 2 and Day 4, and whether this improvement differed between the experimental and control groups. The statistical significance for the differences between group means was calculated by use of a dependent samples t-test for comparisons within treatment groups, and an independent samples t-test for comparison between treatment groups.

Both groups were shown to significantly improve from Day 2 to Day 4 on each of the three dependent variables: T-units, words in T-units, and gross words. Figure 2 suggests that both the experimental and control groups improved from Day 2 to Day 4 in idea generation as represented by the T-unit

measure ($p < .05$ for both experimental and control). Note, however, that although subjects improved within their respective experimental or control group, this improvement was not significantly different between treatment groups. As indicated in Figure 2, the experimental group did show greater improvement, but this difference only approached statistical significance at the .05 level. This overall pattern, representing a significant difference within groups but not between groups, was also similar for the other two dependent variables, words in T-units, and gross words (See Figures 3 and 4).

Discussion

It appears that the process writing instruction used in this study was effective for improving the weekly writing of subjects regardless of their treatment group. Both sets of students made significant gains in their idea generation, as measured by T-units, between Days 2 and 4 in the study. The peer feedback, and the de-emphasis on the mechanical aspects of writing, such as spelling, seemed to help the students improve their compositions. This is supported by a general 4 week trend, indicated by the bar graphs of Figures 2-4, where T-units decrease over the four week period, while words in T-units increase. This general trend

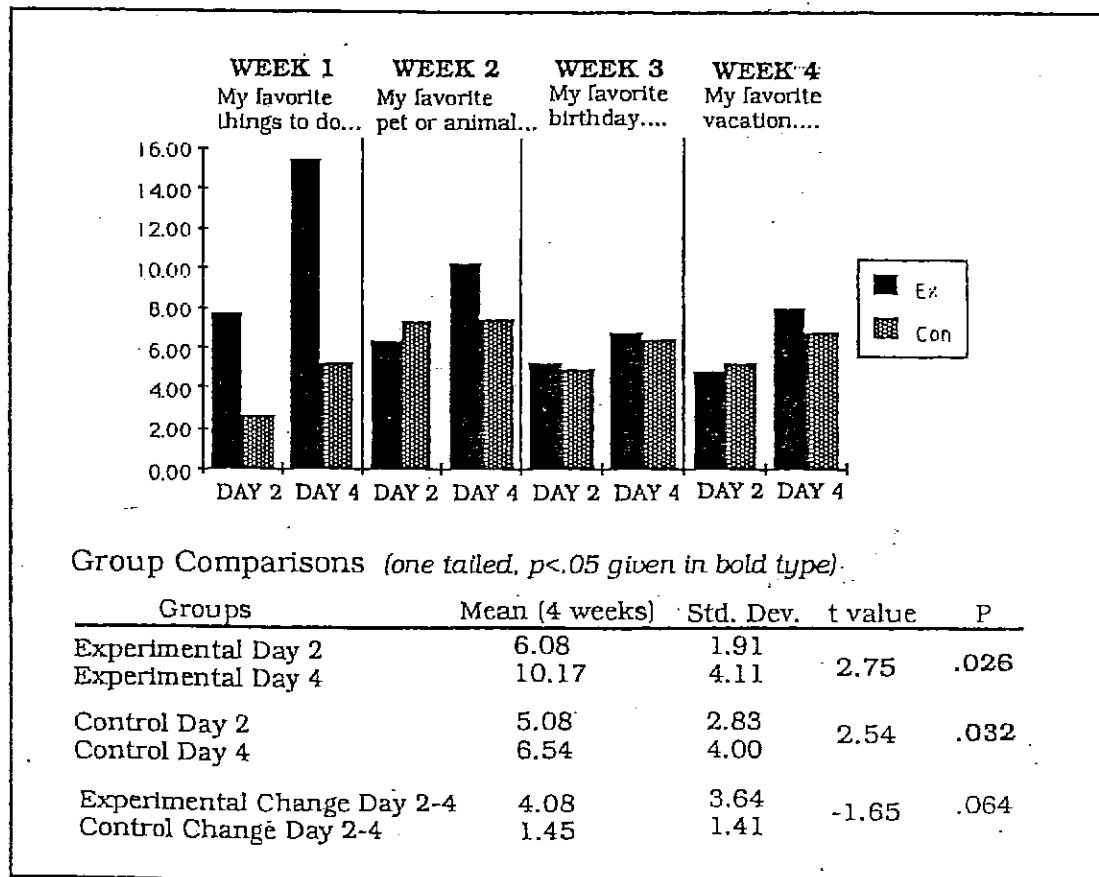


Figure 2. Mean T-Units for Each Study Observation Day

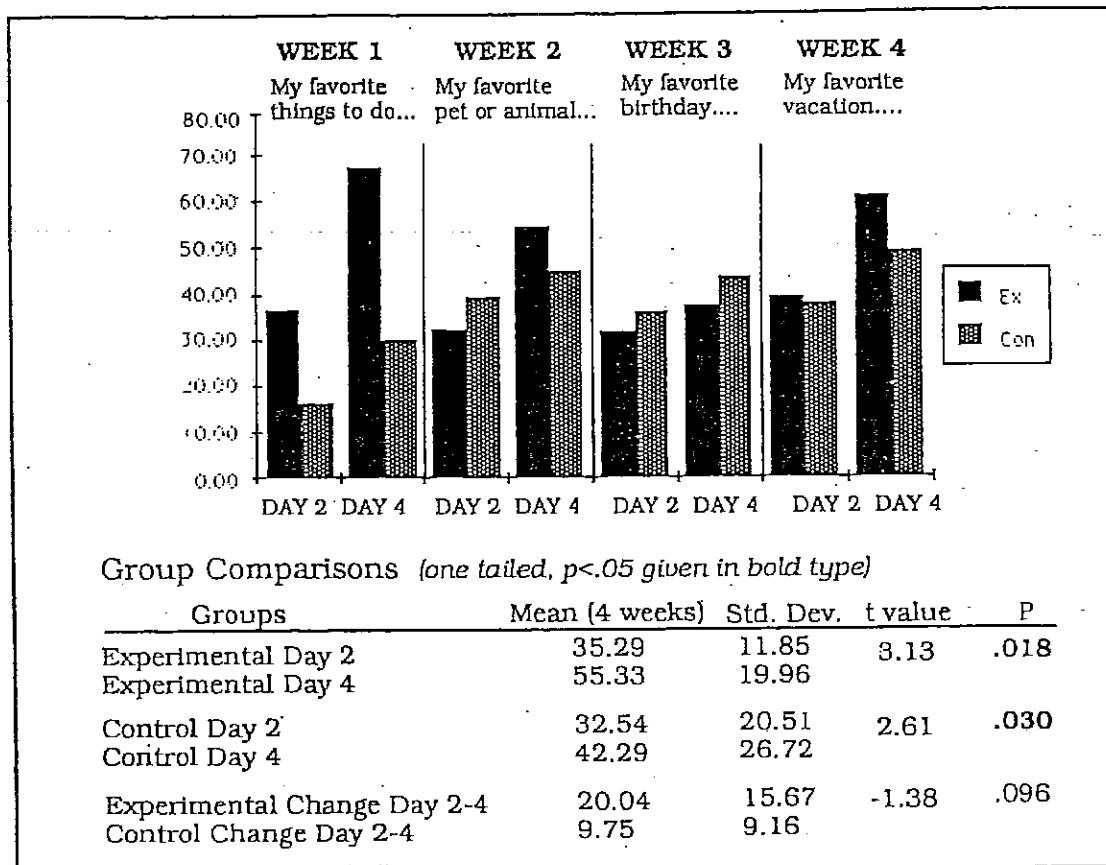


Figure 3. Mean Words in T-Units for Each Study Observation Day

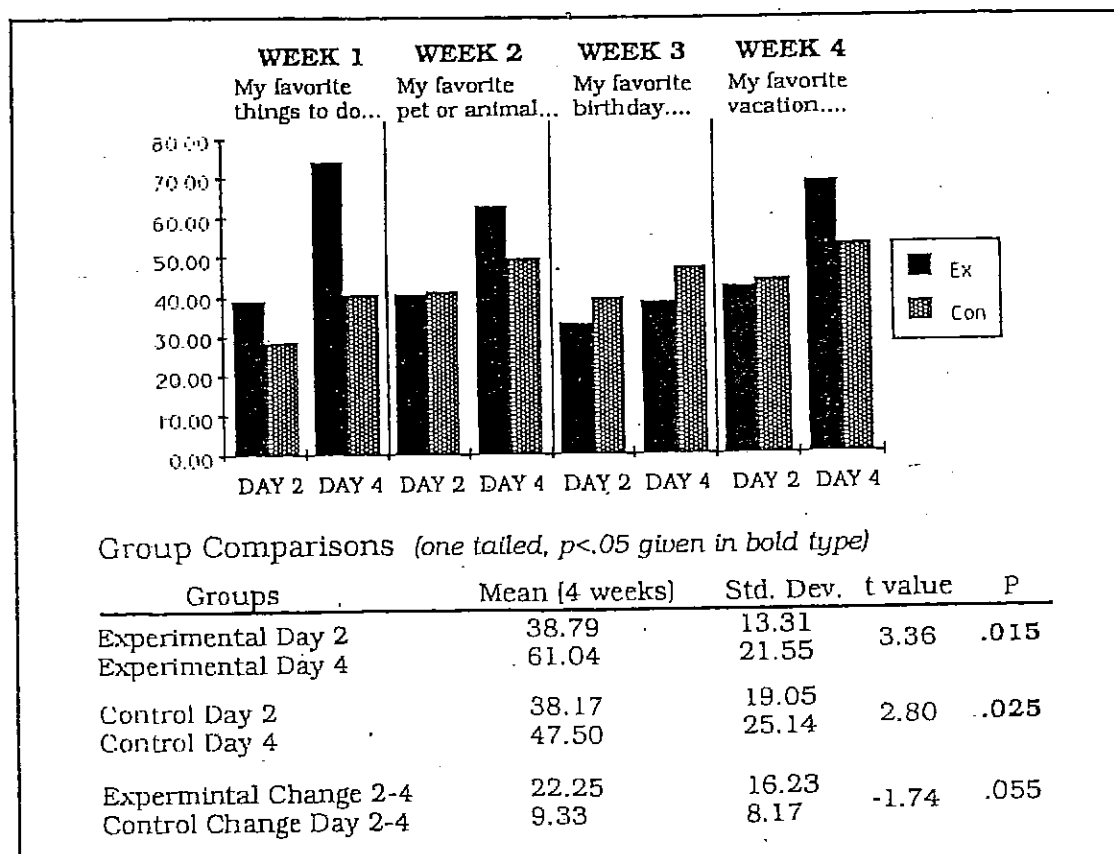


Figure 4. Mean Gross Words for Each Study Observation Day

suggests that students in both groups are becoming more sophisticated in their writing, and refining their ideas more effectively during the revision process.

Although the study failed to find significant differences in T-units, words in T-units, or gross words, between treatment groups, the generally higher scores for the wordprocessing group suggests that some difference may be found in a study using greater numbers, or of greater duration. However, it is expected, based on the data from this study, that any differences found would probably still not be dramatic ones.

Although wordprocessing, when paired with careful process writing instruction, may not be substantially more effective than the traditional pen and pencil method of transcription, this study suggests that it may well be solidly compatible with such instruction. In other words, wordprocessing did not appear to interfere with the idea generation of students involved with our process writing instruction. Considering the primary age of these subjects, and their limited keyboarding and delimited academic skills, wordprocessing could have operated as a genuine distraction to the development and refinement of student ideas. However, the consistent and significant improvement within the wordprocessing group would tend to suggest that wordprocessing did not distract from our writing instruction, and possibly enhanced it.

Further research may want to investigate the effectiveness of combining wordprocessing with process writing instruction by providing students with the freedom to move between the two mediums, so that the selection of the medium, either wordprocessing or pencil and paper, is a student rather than researcher driven decision. It would be interesting to determine if learning disabled students would increase their use of the word processor over time, or eventually give up the use of wordprocessing in preference for the traditional paper and pencil medium. Such a study would better simulate the use of wordprocessing in the adult world, where it is available as a writing tool that may or may not be chosen for a particular writing endeavor.

In summary, it appears from this study that wordprocessing and process writing instruction can interact effectively to enhance the writing instruction of learning disabled students. The LD students in this study seemed to genuinely enjoy using the word processor, and were impressed by the neat looking product that they could create. For LD students, who often are faced with numerous daily failures, the small successes involved in using a word processor to share their ideas effectively may well make wordprocessing a worthwhile educational endeavor in its own right.

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