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

John W. Hill, University of Nebraska at Omaha

Available at: https://works.bepress.com/john_hill1/6/
The Effect of Computer Use on the Process Writing of Learning Disabled Students

Neal F. Grandgenett
Department of Teacher Education
University of Nebraska at Omaha, Omaha, NE 68182-0163

Carol V. Lloyd
Department of Teacher Education
University of Nebraska at Omaha, Omaha, NE 68182-0163

John W. Hill
Department of Special Education
University of Nebraska at Omaha, Omaha, NE 68182-0163

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 word processing 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 word processing 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 Branan 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.

<table>
<thead>
<tr>
<th>Student Work:</th>
</tr>
</thead>
<tbody>
<tr>
<td>MY NAME IS TONI</td>
</tr>
<tr>
<td>I HAVE A STORY TO TELL YOU.</td>
</tr>
<tr>
<td>I HAVE A DOG.</td>
</tr>
<tr>
<td>1S UPON A TIME A GHOST CAME</td>
</tr>
<tr>
<td>INTO MY HOUSE</td>
</tr>
<tr>
<td>AND I WAS SCARED SO I WENT TO MY</td>
</tr>
<tr>
<td>ROOM</td>
</tr>
<tr>
<td>BUT HE FOOLED</td>
</tr>
<tr>
<td>BUT I HID.</td>
</tr>
<tr>
<td>THE END</td>
</tr>
<tr>
<td>I HAVE A CAT.</td>
</tr>
<tr>
<td>THE GHOST AND DONALD DUCK</td>
</tr>
<tr>
<td>DONALD DUCK WUS WOOSHING T.V</td>
</tr>
<tr>
<td>WINA GHOST</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Translation:</th>
</tr>
</thead>
<tbody>
<tr>
<td>/My name is Toni./</td>
</tr>
<tr>
<td>/I have a story to tell you./</td>
</tr>
<tr>
<td>/I have a dog./</td>
</tr>
<tr>
<td>/Once upon a time a ghost came into my house./</td>
</tr>
<tr>
<td>/And I was scared so I went to my room./</td>
</tr>
<tr>
<td>/But he fooled./</td>
</tr>
<tr>
<td>/But I hid./</td>
</tr>
<tr>
<td>The End</td>
</tr>
<tr>
<td>/I have a cat./</td>
</tr>
<tr>
<td>The ghost and Donald Duck</td>
</tr>
<tr>
<td>/Donald Duck was watching T.V. with a ghost./</td>
</tr>
</tbody>
</table>

T-units (as represented by words between slashes) = 9
Words in T-units = 53
Gross words = 60

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 compari-
sons 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

---

**Group Comparisons (one tailed, p < .05 given in bold type)**

<table>
<thead>
<tr>
<th>Groups</th>
<th>Mean (4 weeks)</th>
<th>Std. Dev.</th>
<th>t value</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental Day 2</td>
<td>6.08</td>
<td>1.91</td>
<td>2.75</td>
<td>.026</td>
</tr>
<tr>
<td>Experimental Day 4</td>
<td>10.17</td>
<td>4.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control Day 2</td>
<td>5.08</td>
<td>2.83</td>
<td>2.54</td>
<td>.032</td>
</tr>
<tr>
<td>Control Day 4</td>
<td>6.54</td>
<td>4.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Experimental Change Day 2-4</td>
<td>4.08</td>
<td>3.64</td>
<td>-1.65</td>
<td>.064</td>
</tr>
<tr>
<td>Control Change Day 2-4</td>
<td>1.45</td>
<td>1.41</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*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.

References


*Primary Editor Plus*. International Business Machines, PC Department, 4111 Northside Parkway, Atlanta, GA 30327.


EDITOR
Mary W. Marks

EDITORIAL REVIEW BOARD

Patricia Ainsa
Early Childhood Studies
University of Texas - El Paso

Richard T. Johnson
Dept. of Curriculum and Instruction
University of Houston

Gary G. Bitter
Educational Media and Computers
Arizona State University

Patricia A. McClurg
College of Education
University of Wyoming

James E. Bruno
Graduate School of Education
University of California

Roy A. Moxley
Division of Education
West Virginia University

Barbara Burns
Department of Psychology
University of Louisville

W. Michael Reed
HRE Microcomputer Lab
West Virginia University

Cynthia A. Char
Education Development Center, Inc.
Newton, Massachusetts

Daniel D. Shade
Computers as Partners Project
University of Delaware

Douglas H. Clements
Logo-Based Geometry Project
State University of New York - Buffalo

Steven Silvern
Dept. of Curriculum and Teaching
Auburn University

Gayle V. Davidson
Dept. of Curriculum and Instruction
University of Texas - Austin

George E. Uhlig
College of Education
University of South Alabama

Janice L. Flake
Dept. of Curriculum and Instruction
Florida State University

J. Allen Watson
Children and Technology Project
University of North Carolina - Greensboro