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Anyone who has learned a word-processing program and uses it regularly on a computer at work or home might be disappointed with reports to date on the impact of

the computer on student writing. Features of word processing which allow a writer to revise quickly produced hard-copy drafts should, it seems, effectively serve writing instruction; but until the time students have enough access to computer work-stations to practice and become comfortable with word processing while they are learning to process written language, it is probably too early to judge how effective the computer will become in improving student writing.

Computers are becoming more common in schools. In 1983, Withey predicted that the computer "may have a firmer hold on the future than do English teachers." That same year, a survey (Ingersoll, Elliott, and Smith, 1983) estimated that there were over 200,000 microcomputers in U.S. elementary and secondary schools; and it predicted a 60-percent annual growth rate for the following years. That would suggest that well over two million computers are now accessible to elementary and secondary students and teachers; and in the light of initiatives launched by Federal agencies and some states to develop computer-assisted instruction, that figure may be conservative.

A search of documents entered in the ERIC database between 1983 and 1987 identified over 50 reports on computer-assisted writing instruction; but a review of these documents suggests that the influx of computers into schools does not assure students regular and sufficient time to learn to write on them. It appears that in most schools, computers reside in a computer laboratory shared by all the teachers and students in the school. Students participating in special writing programs usually must leave their more familiar classroom environments and go to the computer laboratory.

HOW MUCH TIME ON TASK?

The presence of computers in regular classrooms may not guarantee that students will have ample opportunity to use them. A Canadian study of 90 teachers and 180 elementary students in three grades (Larter et al., 1987) placed computers in regular classrooms. Each teacher worked with one student learning to write on the computer and with one writing in longhand. This report, which is replete with data on various time-on-task analyses, does not clarify how the teachers scheduled the experiment while teaching their classes. Each experimental subject, nonetheless, had access to the computer in his or her regular classroom; and the average time spent writing on it over a six-month period was an hour a week. Students who logged the most hours on a computer averaged about 60 hours over six months.

Several of the reports in the database indicate that many students learning to write with computers are lucky to get 30 minutes experience a week. Whether the atypically larger amount of time and experience the students in the Canadian study had with the computers was sufficient to allow them to become very proficient word processors is not clear.

WHY DON'T COMPUTERS ENCOURAGE

REVISION?

Limited time-on-task may explain why so many of the reports in the database fail to mention the benefits of computer-assisted instruction in encouraging revisions and why several reports specify that the students did not get opportunities to print and see their efforts in hard copy. Such applications provide no opportunity to evaluate the feature of computer writing that recommends itself to many practiced writers: the almost immediate opportunity to see and react to what one has written and then to make changes which can be quickly reprinted.

Yet the studies which have focused particularly on revision do not support the notion that writing on computers should encourage a student to revise. Daiute (1985) found no difference either in quality or quantity of revision for junior high students writing with and without computers. In another study, Daiute (1986) found that students writing on computers revised less than those using pens and pencils. The computer writers, however, got higher scores on their finished products after getting lower scores on their first drafts, suggesting that computers may have led to more effective revision.

Nor did the college students in Hawisher's study (1987) revise more than those not using computers; but, interestingly, this study found no positive relationship between revisions and quality of writing. For younger children, there are several simplified word-processing programs available, but even with these, it appears that students who are being taught to write on computers do not get enough time-on-task to become comfortable with simple word-processing features like "insert" and "delete" or to use them freely in making revisions--let alone enough time to learn to "block" text, move it for reorganization, and then print and analyze the results for subsequent revision. A recent guide from Phi Delta Kappa (Schaeffer, 1987) outlines the teaching of writing with the microcomputer as a seven-year procedure. Although students in classes following this process are learning simple revision commands in the second grade, the program sensibly reflects the fact that it takes a reasonable amount of time for students to learn word processing.

ARE THERE BENEFITS?

Most of the reports in the database have, nonetheless, found that computer-assisted writing instruction has some effect--if not dramatic impact--on both the quantity and quality of writing (e.g., Stine, 1987). Most of these evaluations rely on informal teacher observation and product review; but the frequency of cautious endorsement of computer-assisted instruction across many of these reports suggests that differences reported are reliable. Some of the relatively rare experimental studies in the database have reported similar results.

However, a report by Dean (1986) questions the potential for computer-assisted writing instruction. Dean found that on a college entrance exam, college freshmen who were not trained to write using word processing outperformed those who were trained to write

on computers. Dean expressed concern about the cost of the computer-assisted writing program and the extra instructional time it required. Hass (1987), on the other hand, found that experienced writers who wrote letters with pen and pencil took longer to complete the task than subjects who followed the guidance given by a computer program and that the letters of the latter group were better.

There are other exceptions to Hawisher's indication that computers did not encourage critical reaction to what was being composed, and they are reported in studies which involved some form of team or peer editing and reaction. Dickinson (1986) found that when collaborating on a writing project at a computer, first-grade children developed language skills while planning and evaluating their project. Heap (1986) reported on a program that teamed a writer with a peer as "writing helper"--a kind of in-process editor--and another classmate as a "technical helper" to advise and discuss solutions to word-processing problems. Piper (1987), Smutek (1986), and Heap each found the computer effective in assisting teamed writing instruction for students learning English as a second language.

IS WORD PROCESSING THE ONLY APPROACH?

Also in the database are reports on the use of computer software which assumes a strong instructional and interactive tutorial role. Most of these programs guide the student writer through the identification of topic, the brainstorming and then organizing of jot notes on the topic, and the application of the resulting outline to produce a written document (e.g., Huntley, 1986). Strickland (1987) conducted a case study using such a program and found it effective. Styne (1986) reported on how a computer program that guides students as they compose poetry generated enthusiasm among college freshmen.

Some teachers of writing at higher levels involve students in the development of their own software programs to guide their writing. Walton and Balestri (1987) discuss studies that link instruction in computer programming and college freshmen composition which they feel help students understand writing as a design discipline. Bruce (1987) cites such approaches as the precursors of the computer's potential in facilitating thinking, creativity, and language development.

In addition to computer software which guides a writer through the formation of his or her own ideas, there are, of course, programs of preformatted exercises that many teachers consider important to writing instruction. Smith (1986) discussed "a plethora of skills and drills software" that often lacks quality because it is not theoretically based. Such programs present, in effect, a kind of electronic workbook, which may have the potential to hold student interest through programmed practice but which may not relate to the process of writing.

WHEN CAN WE KNOW?

The computer's great promise to writers who know how to compose on one is its facilitation of revision. As Withey described it, the computer can be "a blank page on which the student can write, revise, and edit...." What the writer who uses a particular word-processing program needs to keep in mind, however, is how long it took him or her to become comfortable with the new tool. What kind of familiarity with both the keyboard and the written word did the writer have before sitting down to learn word processing? How many hours of writing in front of a computer monitor did it take before the writer learned how to use the features o the program comfortably? When did focus on the computer software stop competing with getting the best words in the most effective order? After how many hours did word processing first begin to serve effective composition?
The ratio of computer stations to students may have to provide more time-on-task before we can adequately evaluate the computer as a tool for writing instruction. That kind of access, it seems reasonable to point out, is going to involve considerable investment in expensive hardware that has an annoying way of becoming obsolete; it also means that teachers interested in using the technology need to be trained to use it productively. With those factors in place, writing instruction will--as has always been the case--rely on the enthusiasm, abilities, and effective methodologies of good teachers.

The teachers and other researchers who are now experimenting with computer-assisted instruction are building an important database that will be analyzed for guidance in developing effective methodologies. The computer is a technology that will almost certainly become more and more accessible in the lives of students, including the young writers involved in the studies reported to date. Many of these students will be writing regularly using computers. Whatever the limits of the experience they got using computers, it can become a valuable one.

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