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## A study of the uses of the microcomputer in elementary school classrooms

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## A study of the uses of the microcomputer in elementary school classrooms

### Abstract

In his article concerning the microcomputer, Gordon (1984) stated that one myth about computers is that they are a "shortlived" fad. Many people feel that the computer craze will soon die out leaving behind wasted equipment and time, but, in fact, the computer seems to be here to stay and educators must keep up with the times and learn about them before they fall too far behind in the field. Along the same lines, Hunter (1983) expresses a more positive view held by many. She states, "parents, teachers, and children believe by learning about computers and learning how to use them, they will be better prepared to survive and enjoy economic well-being in a changing world" (p. 5). So it seems that society itself dictates that youth become involved with the computer and in its uses.

A STUDY OF THE USES OF THE MICROCOMPUTER  
IN ELEMENTARY SCHOOL CLASSROOMS

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by  
Steven Paul Trost  
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has been approved as meeting the research paper requirement  
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## NEED AND VALUE OF COMPUTERS

In his article concerning the microcomputer, Gordon (1984) stated that one myth about computers is that they are a "short-lived" fad. Many people feel that the computer craze will soon die out leaving behind wasted equipment and time, but, in fact, the computer seems to be here to stay and educators must keep up with the times and learn about them before they fall too far behind in the field. Along the same lines, Hunter (1983) expresses a more positive view held by many. She states, "parents, teachers, and children believe by learning about computers and learning how to use them, they will be better prepared to survive and enjoy economic well-being in a changing world" (p. 5). So it seems that society itself dictates that youth become involved with the computer and in its uses.

Educators are also becoming aware that students should not only be taught computer skills out of necessity, but also that using computers benefits them in many ways. Many students actually "show significant gains in performance when using computer programs in their studies" (Judd, 1984, pp. 94-95).

In a brief survey that shows the "incredible pace" at which computers have developed, considering the lowering cost of microchips coupled with the increasing capabilities of these chips, Leger (Note 1) offers three challenges. First, he challenges educators to "learn as much as possible" about computers. Secondly, educators should "open the way for students to use" computer

technology, and third, he cautions, "Use computers wisely."

#### WHO USES COMPUTERS

Statistics gathered by the U. S. Department of Education and reported in a book edited by James L. Thomas (1981) indicate that "one-half of the nation's school districts provide access to at least one microcomputer" (p. 141). And these numbers appear to be changing. These statistics also show that up to the present, most computer use is being centered in the secondary schools, but the elementary schools are gaining ground.

Barrette (1983), in reprinting the speech of Dale LaFrenz at a microcomputer conference, points out a glaring problem. In listing "six points of reality" concerning computer technology, LaFrenz is quoted as saying one problem is "not all students are being exposed equally to this technology" (p. 3). Students fortunate enough to be in the talented-and-gifted programs seem to be the major recipients of the new technology although more and more regular classrooms are also becoming involved.

Additionally, the problem concerns dollars and cents. "Microcomputer use is associated with the wealth of a school district" (Lipkin, 1983). Implications are somewhat obvious, although not much different than in other areas of education. The cost many times determines the level of education a child will receive. Apparently, however, not only do wealthier districts have more computers, but they also use them differently, focusing on the higher level uses rather than simple "punch-and-get"

techniques (Lipkin, 1983). Some of this difference appears to result from the attitude of the parents and community as to what is important concerning the computer.

#### APPROACHES TO COMPUTER USE

Edwards (1978) mentions, among other uses, some basic objectives of computer instruction. They fall into five categories: computer assisted instruction, computer literacy, computer science, clerical uses, and word processing. (p. 3)

##### Computer Assisted Instruction

Computer assisted instruction, or CAI, as it is commonly referred to, is the topic covered most often in educational uses of the computer. Among the many advantages given for CAI, foremost seem to be the individual nature of the instruction and that "computers make learning an active process" (Bork, 1981, p. 2). Chambers and Sprecher (1983) caution, however, that "CAI can be an effective teaching tool only if used under the proper conditions (p. 23). There seems to be no doubt that "computers hold the attention of the student" (Judd, 1984, p. 2). Anyone that has ever been around them would have to admit that computers have a captivating quality to them. Kids are astounded by what they can do and their natural instincts tell them to learn more about them. This may become a problem, however, in the fact that the computer sometimes is more of an electronic game than a learning tool.

In order to effectively use a CAI program, the teacher must

be careful not to fall into some common pitfalls. An educator must remember that "the benefits of technology can't be expected overnight," and also that "technology isn't always the best tool for certain objectives" (Barrette, 1983, p. 3). In other words, computers aren't an answer to every prayer and they won't bring immediate results. Too many teachers think that if they try something once and it doesn't work, then it's no good, and they won't try it again. One bad experience with computers can ruin many years of good things for students of these teachers if this attitude is present.

Some teachers also have the fear of being replaced by computers. Bramble and Mason (1985) say this fear is "not substantiated" (pp. 70-71). What is evident is that educators must "change some of their teaching and learning styles" (Judd, 1984, p. 2). One thing made evident in much of the research is that individualized education, a generally well-accepted educational device, is made much easier by the correct use of the computer. But it will still take a teacher to organize and to assist the student in his education.

Some of the common means of implementing education, however, may change. Take for instance, the textbook. Bork (1981) mentions that, given a supply of good material, the computer has the potential to replace the textbook in some instances (p. 2). This would be a welcome change for the computer software industry, a serious problem for the textbook companies, but, nonetheless, a



potential development in the field of education.

To implement a CAI plan, Chambers and Sprecher (1983) outline certain general steps that need to be taken. A first step is to conduct a needs assessment. Although this is somewhat supplemental, an educator must know what benefits he hopes to gain from the CAI plan. Next, the educator needs to identify the courses and the students with whom he intends to use the program. After that, the educator needs to identify the objectives for the program and then comes the actual selection of hardware and software and their implementation.

It is important that an educator take Judd's (1984) advice and "use a way that's comfortable and makes [his] teaching more effective" (p. 52). In this way, the teacher will feel as though he is still the teacher and he won't suffer from attitude or emotional trouble triggered by the computer.

### Computer Literacy

Computer literacy could be termed the nuts and bolts of computer instruction. Defined by Hunter (1983), computer literacy is "whatever a person needs to be able to do with the computer and know about the computer to function in an information-based society" (p. 9). This includes knowing how to hook up the computer, how to turn it on, how to type, and other necessary operations. It also includes "social and ethical issues" (Bramble and Mason, 1985, p.289) in addition to these operations. Furthermore, Douziech (Note 2) lists the gains that students achieve in computer

awareness. They are: "basic operation, roles the computer can play, how to manipulate the computer to fit your needs, algorithmic thinking, and computer vocabulary." None of this can be achieved without hands-on time, though. "To develop literacy, the students must use computer programs" (hunter, 1983, p.19). Stated another way, "Technology doesn't work by itself, you must put it to work" (Barrette, 1983, p.3).

### Computer Science

Computer science is an area that generally resides in the secondary school. Elementary students do not yet possess the mental aspects of high level computer technique. In a simple way, somewhat dependent on the students' individual capabilities, programming can be used, at least with some upper level students, but for the most part, lower elementary students need not concern themselves with how a computer works inside; they just need to reap the benefits of associating and interacting with it.

### Clerical Uses

Clerical uses of the computer offer advantages more to the teacher than to the student, although the student will receive indirect benefits from them. By speeding up such tasks as record keeping and grading, the teacher is given more time to spend doing more things for students. (Edwards, 1978, p. 126) In addition to the uses mentioned above, other typical uses include attendance records and inventories, and all of these uses allow the teacher more time to spend doing what he gets paid to do— teach.

### Word Processing

Word processing could almost be classified under the clerical uses section but is listed separately, primarily because of the opportunity for the student to use word processing in certain educational situations. If the classroom's computer also includes a printer, then the programs available today for generation of materials become an extreme time saver for the teacher and a source of some pride-producing products for the student. Teachers, now, are not limited to materials they have to purchase from textbook companies; they can make their own professional quality classroom materials.

### AREAS OF COMPUTER USE

Education experts seem to agree that the computer is reaching into virtually every corner of American education. Math continues to be the field with most computer use, but, by and large, all subject areas have material available for use by elementary students. Language arts is rapidly growing in terms of computer material (Clements, 1983), but science, social studies, music, and special education are also included at elementary levels. More will be mentioned in the next section on ways computers are used in these areas.

### TYPES OF COMPUTER USE

Computer use is divided into four primary categories. Judd (1985) mentions tutorials, drill and practice, problem solving, and simulations and games as being the major divisions.

Most researchers seem to agree with these divisions although some don't want to include games as an educational term.

### Tutorials

Tutorials are the programs being used more frequently in language arts and reading areas. (Clements, 1983). In this type of program, the computer presents reading material followed by questions which, obviously, it checks and provides correct answers to. Tutorials can be used in any classroom situation where new or review material needs to be mastered.

### Drill and Practice

The drill and practice programs, still the most widely used types of programs, are used mostly in math areas. Language arts programs are now also coming out with drill and practice work in certain aspects of language such as parts of speech and punctuation. The distinct value of these types of programs is the reinforcement capabilities they possess. The computer never tires of asking questions and giving answers. The primary advantage these programs offer is in helping a student who has been absent or who can't understand something to master that topic at his own convenience and at his own speed.

### Problem Solving

Problem solving is used for higher level students, but even at a very elementary level helps to get students to understand the rudimentary concepts of a step by step approach to completing something. It also helps them check their processes, especially

in math areas. Students using this type of program soon learn that the computer accepts and performs things when done in a logical and proper order.

### Simulations and Games

Although the games at first seem to be extra-educational, they can be a fun way for the students to work on various concepts and tasks. Judd (1985) mentions that simulations "allow a student to do some things not available in some classroom settings or possibly too dangerous to attempt there" (p. 10). Simulations seem to have become popular and effective in science experiments and social studies areas. A student can relive battles of the Civil War, can sell things in his own business, and can even travel in outer space, all things not available to a typical elementary student.

The teacher must take care, however, not to let the students become too intrigued by the simulation itself that they lose the educational thrust of the program.

### SOURCES OF COMPUTERS AND MATERIAL

When people think of computers, they generally include the hardware as well as the software for the system. Computer hardware includes the computer itself, the keyboard, the memory, the printer, the monitor, and possibly another piece or two of equipment. The software includes cassette tape or the diskettes in most classroom settings. Where to get these materials and what kinds to get become an economic and preferential decision.

The most popular computers on the market today for school use are the Apple, the Commodore 64, the TRS-80, IBM, and Atari. Each has its own selling points and price, and, as just mentioned, each is preferred by a different customer.

A far more difficult problem is the selection of appropriate software for use on the computer, whichever one is chosen. Chambers (1983) mentions that the choice boils down to purchasing pre-made material or developing self-made material. (p. 60). Pre-made, or canned, programs are available by the score and are ready to be used the instant they are received. Self-made material requires much more time and effort but in many situations, the ability to control the finished product is more important. Not many teachers, though, are able to produce a product that has the capabilities of most of the professionally developed material.

Canned programs are available through computer manufacturers, publishing companies, software companies, computer magazines, small, private businesses, local stores, and computer clubs (Judd, 1984, p. 45) so there is not a lack of choices. The major decision to be made is how much money to spend. Chambers and Sprecher (1983) suggest that when looking for computer equipment and courseware, a teacher should "look down the road five years rather than at the present" (p. 177). They indicate that the ever changing field requires schools to keep up or they will soon find themselves with obsolete equipment.

## EVALUATION

No matter which computer is chosen and no matter which software is used, the teacher must still evaluate the whole process and determine if good education is taking place. This process is no different, theoretically, from any educational evaluation. Some subjective decisions will have to be made; hopefully, they will be correct. Bramble and Mason (1985) give a checklist for quick evaluation of computer software. They suggest that none of these items should be present in good courseware: "audible response to error, rewards for failure, uncontrolled sound, uncontrolled screen advance, any errors, insults or sarcasm, no back-up copy, and poor documentation" (p. 173). If any of these are present, they would suggest not purchasing the material. Good material should be controllable and reasonably private.

It is generally found that whatever computer or courseware is chosen, successful learning can take place if the whole process is used in the correct classroom manner. If the computer is only used as a toy or as busy-work, little is gained, but if it is "used for student manipulation during actual learning, the computer can enrich and diversify existing resources" (Higgins, 1983, pp. 4-6).

Another primary consideration in evaluation is whether or not everyone is comfortable with the computer. If the teacher or the students have fears about the machine, then it probably won't bring about the success that it is capable of bringing.

## SUMMARY

In summarizing the research on this topic, one must look primarily at the potential the computer possesses. Educators must remember that technology has limitations, but, when used in proper ways, these technological wonders possess abundant reserves of future learning. Rushby (1979) calls some of this learning "serendipity learning" (p. 34). Indeed, the computer has the potential to open doors to many different areas for the student who is at first unafraid of getting started. This appears to be the motivational goal for the elementary teacher of the 1980's.



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