

1985

Microcomputers in education

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Schultz, Michael J., "Microcomputers in education" (1985). *Graduate Research Papers*. 3316.
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Microcomputers in education

Abstract

With the ever-increasing use of the microcomputer in the classroom, numerous studies, surveys, and reports have been done on this topic. One would think that with this new technology at a teacher's fingertips, everyone would be excited and eager to get a microcomputer to use in his/her classroom. Such is not the case. Many teachers are hesitant about the computer, while others are ready and willing. Perhaps it is because of the drastic, sudden push for computer use and computer literacy. Perhaps it is because of the competitiveness among state education agencies. Whatever the reason, most believe that microcomputers are here to stay, and educators should become accustomed to it. Being comfortable with the computer is the key to its success or failure in the classroom.

MICROCOMPUTERS

IN EDUCATION

A Research Paper

Presented to

The Department of Educational Administration

and Counseling

University of Northern Iowa

In Partial Fulfillment

of the Requirements for the Degree

Master of Arts

by

Michael J. Schultz

August, 1985

This Research Paper by: Michael J. Schultz

Entitled: MICROCOMPUTERS IN EDUCATION

has been approved as meeting the research paper requirement for the
Degree of Master of Arts.

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One would think that with this new technology at a teacher's fingertips, everyone would be excited and eager to get a microcomputer to use in his/her classroom. Such is not the case. Many teachers are hesitant about the computer, while others are ready and willing. Perhaps it is because of the drastic, sudden push for computer use and computer literacy. Perhaps it is because of the competitiveness among state education agencies. Whatever the reason, most believe that microcomputers are here to stay, and educators should become accustomed to it. Being comfortable with the computer is the key to its success or failure in the classroom.

Four areas concerning the microcomputer in education will be reported on in this paper:

- I. The growth of the microcomputer in the schools
- II. The uses of the microcomputer in the schools
- III. Some positive attitudes toward the microcomputer
- IV. Various negative attitudes toward the microcomputer

The Growth of the Microcomputer in the Schools

The computer is not a new device, nor is it a new idea; it has been in existence for many years. However, the microcomputer is the new and modern trend in the computer field.

Some researchers look at the growth of the computer as coming about in three stages of technological development.

First, the new technology follows the line of least resistance. The computer was first introduced to just about every child in America in the form of handheld, computerized football and baseball games.(1) Video games also introduced countless youngsters to the magic of computers.

The second stage of computer technological innovation has been in the areas of Computer-Assisted Instruction(CAI) and Computer-Managed Instruction(CMI). These technologies have centered on the use of the computer to accomplish educational goals by supplementing reading, writing, science, and mathematics instruction.(2) These take the form of drill and practice models, as well as management systems.

(1) Pricilla Norton, "Computer Potentials and Computer Educators: A Proactive View of Computer Education", Educational Technology, October, 1983, 16.

(2) Ibid., p. 17.

The third stage is the discovery of new uses that grow out of the technology itself. This means that computer technology should be viewed as a contributor to instructional situations that no other alternative vehicle can provide.(3)

In this whole realm of computer technology, the most recent role for computers in education is in the area of computer literacy. The major premise is that knowledge and understanding of computers and computing, skills for using computers, and positive attitudes toward their productive roles in society are desirable and necessary goals for formal education.

Researchers conclude that developments have reached the point where every child must achieve some degree of computer literacy, if nothing else but to understand what is happening in the world around him.

In order for computers to be productive and to provide literacy depends upon the quality, cost, and effectiveness of courseware. At the present time there is a shortage of good software, inadequacy of training, and less than perfect machinery. Top-quality software will arise from good classroom practice well-integrated into the curriculum.

(3) Ibid., p. 17.

No matter how the researchers label the stages of growth and development of the microcomputer in education, its use is definitely increasing. With this increased use, more high-quality software will be developed, resulting in a more computer-literate society.

The Uses of the Microcomputer in the Schools

As the microcomputer gains importance and popularity in the field of education, its uses are becoming so wide and varied that it can be used by virtually everyone.

The traditionally held view of technology has been that machines are tools designed to extend the physical and sensory capabilities of man. In addition, some see new technologies as the development of tools which extend the capacity of man to think either directly or as a consequence of their use.

The microcomputer is one such tool that has been used as an extension of the capabilities mentioned. First, it was used mainly for computer management functions, such as for storing information and for instructional management. Teachers used it to compute grades, record student attendance, and follow student progress.

More recent use of the computer has involved the students. Children appear to use computers in two principal modes. The first mode is individual work.

The main benefits to learning are strong motivation and self-paced activities. The child has time to pause and reflect, to try again, and finally to go to the teacher if help is needed. The second mode is a social one. Two or more children work cooperatively, exchanging ideas, prompting questions, and testing hypotheses.

Whether a child works alone or with another, the computer has a wide variety of uses. The most widely used application is drill and practice. This approach utilizes the computer's ability to generate endless repetitive examples, provide instant feedback, and sometimes grade the level of difficulty. Such programs are mainly designed to improve skills and cater for the lowest cognitive level.

Another use of software is for mastery learning. This is similar to programmed learning. The learner is taken through material in sequential stages. If he fails the short tests at the end of each stage, the learner is not only told he is wrong but given the reason and further help. As a result of this type of learning the child can learn at his own pace and teacher's attention is focused on those who most need help.

A third use of the computer is for simulation exercises. A scenario is constructed by the computer and the learner is invited to take an active role in deter-

mining outcomes. This approach appears to be more suited to adolescents, but this may be more of a question of the difficulty of constructing such programs in terms that younger children can understand.

Another use of the microcomputer is for problem solving using logic(Prolog). This activity is designed to help children think in clear, logical ways, and to use this understanding to solve complex problems. The essence of the learning is to be able to formulate the right questions to gain the maximum information with the minimum of ambiguity. These investigations clearly require a very high level of cognitive functioning and one that will have considerable relevance to future computer applications.

A fifth computer use is that of child-controlled environments. In this capacity the child operates the computer directly, thus programming the computer's activities. The language used is Logo, originated by Seymour Papert. The intention is that children should be in control and explore the environment much as they do in sand and water play.(4)

(4) Michael Buckingham, "Computers and Education: Where We Are and Where We Might Be Going", Early Child Development and Care, Vol. 12, 1983, 159.

Word-processing is a more recent development of computer use by children. This greatly simplifies the mechanics of writing, editing, correcting, and retyping a report or manuscript. With the satisfaction of producing clean, professional-looking copy, students may be more motivated than ever before to tackle the task of composition.

Microcomputers can help students produce not only text but also music, line drawings, geometric shapes, and animation. Children can explore the basic concepts of art such as color, balance, form, and visual flow. Some of the most imaginative uses of computers have been in the creative arts.

One of the most valuable uses of the computer is its ability to store information, search files, and bring to the screen any information that is stored. Having this direct access to stored information makes the computer a great timesaver.

The many uses of the microcomputer have been mentioned, but little has been said about the users. Little needs to be said at this time about the users, except for the fact that the microcomputer is for all persons and all ability levels. Whether it be used for enrichment for talented and gifted, or for special education

students, there is software available for all abilities and ages. The microcomputer is not for one group alone.

Some Positive Attitudes Toward the Microcomputer

With the ever-increasing use of the microcomputer in education, not enough good can be said about it.

Some of the strongest proponents of microcomputer education have noted that students who learn how to program may learn general higher-level skills in the process. Higher-level skills are a natural outgrowth of any well-designed learning experience(5), and these skills are essential when it comes to problem-solving. Computer education, therefore, is regarded as the introduction of a planned problem-solving curriculum into the total educational process.(6)

In addition to these thinking skills being developed, the microcomputer encourages social interaction among students. Many teachers have noted more collaborative, cooperative problem-solving among kids who are doing computer activities together than anywhere else in the school. This working together gives stu-

(5) Joseph M. Scandura, "Three Roles for the Computer in Education", Educational Technology, September, 1983, 16.

(6) Norton, op. cit., p. 18.

dents a feeling of self-worth and a more positive attitude toward school. Several schools have even reported increases in attendance and decreases in vandalism as at least a partial consequence of the introduction of computers for remedial education. Not only is student interaction with other students enhanced, but the addition of computers-as-tutors to the classroom environment can make teacher-student interactions more fruitful by expanding the student's base of experience and practice.(7)

Aside from the development of thinking skills and positive attitudes, the microcomputer is simply regarded in many classrooms as a valuable aid. Many teachers feel that the computers' patience and flexibility make them helpful aids, especially with children having learning difficulties or with children who are discipline problems.

Besides the computer's patience is its capability not to criticize students for being wrong, while at the same time requiring correct responses in order for it to work. The computer provides maximum time on task and immediate response, and it gives students a sense

(7) Joseph T. Lipson, Kathleen M. Fisher, "Technology and the Classroom: Promise or Threat?", Theory into Practice, Volume XXII, Number 4, Autumn, 1983, 255.

of being in control of their own learning. New software has provided for this individualization in that it is able to diagnose errors and branch to the correct program for each student. The students can then proceed at his/her own pace and avoid any embarrassment about making mistakes. Because of this feature alone, many teachers regard the microcomputer as one of the most valuable teaching tools available.

Computer use has many advantages, but before any of the above can be achieved with the microcomputer, the computer educator must learn to recognize the following principles:(8)

1. Computer education is more than teaching facts and skills.
2. Computer education teaches habits of thought which are different from and complementary to other forms of thinking.
3. The computer is a tool which provides students with a process for problem-solving.
4. Computer education is part of an integrated, interdisciplinary educational process.
5. Teachers must be familiar with the social implications of computer technology.

Not only are teachers and students the only ones affected by the microcomputer, but the private sector should also become involved. Support from business and industry can come in the forms of fundings, hardware,

(8) Norton, op. cit., p. 19.

and volunteers. These volunteers may include retrained teachers, advanced placement students, retired persons, college and university personnel, and community agencies.

It is obvious that everyone should become involved in order for computer education to be successful. Only then will the computer be put to its greatest use.

Various Negative Attitudes Toward the Microcomputer

As there are many educators who favor using the microcomputer in the classroom, many view it as a threat. There are many problems to be solved before it can be put to good use.

One of the first complaints dealing with microcomputers is that there just aren't enough to go around. Many schools have a ratio as high as 200 students per 1 microcomputer. This is improving, but not fast enough to expose all the students to the computer while still in the elementary grades. The major reason for this shortage is the expense involved in obtaining hardware and quality software. This will continue to be a problem until state legislatures decide to provide for funding for computer education.

Another area of concern of educators is the need for training. Since the majority of teachers do not have computer experience or technical expertise, any

district contemplating the implementation of new technology programs must consider how to address this need.(9)

A third complaint often heard from educators concerning computers is how they should be incorporated into the current educational system. Stable, successful organizations resist change when change is crucial to their ability to survive. The organizational structure of the schools helps people to be productive with classrooms, blackboards, textbooks, and homework assignments. It does not have a place for the large-scale use of computers. If computers are to be used extensively, schools will be required to think through a new organizational structure that is centered on helping teachers to be more productive with the computer.

One step beyond getting computers into the schools is the problem of integrating them into the curriculum. While there are a growing number of programs and courseware packages in reading and mathematics, in science and social studies, a major need is to have that software relate to ongoing instructional activities. Many teachers have taken this problem on themselves and have created their own software or found parents or students who can.

(9) Linda G. Roberts, "The Computer Ages Comes to Our Nation's Classrooms", Theory into Practice, Volume XXII, Number 4, Autumn, 1983, 310.

Another solution is to find or develop software tools that allow students to function directly in the content area. Many of the already developed tools, however, need to be reformulated and revised for children. Integration into the curriculum remains a distant, far-off goal as long as computers are precious resources and schools have few to go around.

There are other problems concerning educators dealing with computers, some of which may not seem to be major, but deserve at least to be mentioned. Some teachers have voiced suspicions that the computer may reduce employment opportunities, and others are concerned about the lack of human contact between teacher and pupil. Teachers felt that human interaction is at the heart of school learning and that increased use of computers could reduce that interaction. Still others are concerned that computer use will deteriorate students' penmanship as they begin composing text on the computer in the early grades. Who is to say if this is a serious loss in education, or perhaps it should be viewed as constructive evolution. There are others that contend that we need better talent authoring instructional materials, better programming and programming languages as opposed to commercial purposes, and more research on learning in a technological environment.

Summary

It seems that for every advantage for using the microcomputer in education, there is an opposing side. As long as there are teachers, there will be two sides to the issue. It is doubtful that there will ever be one-hundred percent participation with computer use, but hopefully before a decision is reached, both sides will be thoroughly examined.

Computers have come a long way since their beginning, and it is hoped that they will continue to be used as long as there are people willing to take the time to recognize their value.

With a little time and effort one can become knowledgeable about what the computer has to offer. Its uses and advantages certainly outweigh the negative attitudes, if not in quantity, at least in importance and value. Educators should accept the fact that the computer is here to stay, decide what they want it to do for them, and try to make the best of it. Certainly every teacher has the intelligence and stamina to make the computer "work" in his or her classroom. With some extra effort the computer may become "a teacher's best friend" in no time at all.

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