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Technology and its Implications for Early Childhood Educators: Considering the Microcomputer in the Kindergarten

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TECHNOLOGY AND IT'S IMPLICATIONS FOR EARLY CHILDHOOD EDUCATORS: CONSIDERING THE MICROCOMPUTER IN THE KINDERGARTEN

by

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Abstract

Kindergarten teachers can effectively and sensitively intergrate the microcomputer into a curriculum which strives to meet the needs of the total child. This study indicates, through a review of professional journals and current books on the microcomputer in education, the need for technological skills. It demonstrates the presence of microcomputers in today's schools, even in the early years. Uses of the microcomputer in the kindergarten classroom are presented for consideration. Recommendations are included which call for informed and caring teachers to use the microcomputer to meet the social, emotional, and cognitive needs of the individual child.

Chapter One

Introduction

Problem Statement

As microcomputers fast become an integral part of the educational environment, even in the early years, can the kindergarten teacher effectively and sensitively integrate this new technology into a kindergarten curriculum which meets the needs of the total child?

Rationale

In the last two years studies concerning American schools have, almost unanimously, called for computers in the classroom (Bradley, 1984). By the end of this century less than twenty percent of the working force will be engaged in the production of goods. The economy will be producing, distributing, and consuming knowledge (Arters, 1981). This change to an information oriented economy provides a great challenge to educators. If students are to be adequately prepared for this technological world, schools must provide the skills necessary for future success. If not, the students of today will be the disadvantaged adults of the future (Ornstein, 1981).

Schools are responding to this educational need. Since 1980 the number of computers in use throughout American schools has risen from a few thousand to over one million ("Computers in Education," 1985). Money is also being invested in the

training of educators in computer literacy. Last year President Reagan signed into law a bill that provided funds for courses in math, science, and computer instruction. Even though the need for microcomputers in the school environment is being met, the effective use of the microcomputer must now be addressed. Educators have not taken enough time to determine how to use this new boon (Shuttenberg, 1985).

Since microcomputers are now a part of the young child's school environment, early childhood educators must consider the role of the microcomputer in the kindergarten classroom. The choice of how this educational tool is to be used is the responsibility of the kindergarten teacher (Burg, 1984). The early childhood educator must consider the ideology that teachers of young children must meet the needs of the total child. The microcomputer provides a tool, which when used in a timely and effective fashion, helps attain this goal by enhancing the education of the individual child (Morgan, 1983). The social, emotional, and cognitive impact of the microcomputer must be of equal concern. Turkle (1984) relates the use of the microcomputer to the emotional, as well as, cognitive development of the child and suggests that the computer can be used as a means of social development.

The early childhood educator must consider the fact that microcomputers are here to stay and that there is no one

position of how to best use this tool in kindergarten. The concerned kindergarten teacher must take bits and pieces of research available and combine these findings with personal beliefs as an educator of the total child to find an effective place for the microcomputer in the classroom.

Purpose

The purpose of this study will be to show that the kindergarten teacher can effectively and sensitively integrate the microcomputer into a kindergarten curriculum which meets the needs of the total child.

Chapter Two

Review of the Literature

The microcomputer is no longer a tool of the visionary. It has become quite common place in businesses and homes. The educational world is incorporating microcomputers at every level of the formal learning experience. In the educational settings of the young child, microcomputers are finding a place among the blocks and sandpiles. Kindergarten teachers who pride themselves on creating environments that meet the needs of the whole child, must consider the implications of the microcomputer.

This study, through the use of current literature, addresses the fact that the microcomputer is an important part of today's world. It focuses on the emergence of the microcomputer in schools, specifically in the classrooms of the young child. And lastly, it indicates that the microcomputer can be used to meet the needs of the kindergarten child.

Computers Are Here To Stay

Computers are here today, and they will be here tomorrow. The technology that was once considered furturistic is a reality.

It was projected by Molnar (1981) that by this year 75% of all occupations will deal with computers. Traditional industrial jobs are no longer certain occupations, as modern technology has proved to be a much more dependable investment. Not only

is the microcomputer much more reliable, but it is faster and more accurate. Just as the industrial revolution changed society, so too the age of technology is altering society (Wayth, 1983).

The amount of new information is increasing at an unbelieveable rate. One can imagine just how quickly when you consider Wayth's (1983) calculation that the bulk of information is doubling every five years. How might a society propose to record the reams of information yet to come? Most of the work force is involved in some way with the processing of information (Moynes, 1984). The microcomputer is being used to organize, to store, and to find information (McCrory, 1984). As we advance into the age of information, the computer may be moving us toward a paperless society (Schiffres, 1984).

Microcomputers are not merely a vital part of the American economy. The new technology is making tremendous contributions in the field of medicine. Technology is involved in such controversial issues as conceptualization of life and death (Robinson, 1982). The microcomputer has even made its way into homes. The home microcomputer is being used to organize and record family budgets and to keep household inventories. It is even providing the conveniences of sophisticated home appliances.

Parents view the microcomputer as a means of preparing their children for the future. In 1983, $94 million of the home software market was spent to buy programs for young children and

it was projected that this figure has already doubled (Bulkeley, 1984). This finding demonstrated that parents view the microcomputer as an important part of a child's development. Olds (1985) commented on how computers will change not only how we do things, but the way we even consider doing things. It is interesting to consider how the microcomputer is influencing the manner in which parents rear their children. Parents who used to view early exposure to books as a sure head start to success in school, are now employing software as well.

It has been parental pressure that has forced the issue of computers in the classroom. Parents have organized, raised funds, and simply insisted on the presence of microcomputers in the formal education of their children (Olds, 1985).

This wave of parental pressure, as well as the demand for students who are better prepared to meet the job requirements of today, has forced the educational world to incorporate the microcomputer in the schooling of today's young. Educators now realize that students must be able to locate and use the wealth of information which the new technology has and will continue to set before us (Robinson, 1982).

Education and the Microcomputer

As society changes, so do the demands a society makes on education. If the aim of educators is to develop lifelong learners, schools must teach technological skills to today's

students (Ornstein, 1982). It is fundamental that an educator never lose sight of the fact that one is preparing students for the future (Pierce, 1972). To do this educators must provide a wealth of experiences that insure mastery of the skills of using technology to process information (Norton, 1985).

Schools are responding to this need. Microcomputers are being used to prepare students for success after leaving school, as well as to enhance the learning of other academic skills (Keogh, 1982). More than 12,000 of America's nearly 16,000 school districts have microcomputers in their classrooms (McBee, 1984). Three out of four students use microcomputers in their studies in the elementary grades. Most children of this age are likely to spend at least sixty minutes a day using a microcomputer ("More Elementary Students," 1985). Most school systems therefore, have recognized the microcomputer and have become well supplied (Keogh, 1982).

Now that schools are equipped with microcomputers, educators are deciding how they can use the microcomputer in an effective way. Even early childhood educators are becoming involved in the use of microcomputers within the learning process.

Early Education and the Microcomputer

More and more children are being exposed to microcomputers at an early age. They have made their way into the preschool

classroom. Yet early childhood educators are still in the process of exploring just how the microcomputer should be used. It is agreed that microcomputers be used after careful consideration of the curriculum, as well as considering the capabilities of the individual child (McCrory, 1984; Burg, 1984). Most imperative is that teachers of the young child take leadership in this field (McCrory, 1984). Research indicated that programming at an early age should be a consideration of the early childhood educator.

Logo, a computer language created by Papert at the Massachusette Institute of Technology's Artificial Intelligence Laboratory, is reported to be most in keeping with the aims of early childhood educators (Tipps & Sanders, 1982). The development of Logo is based on educational theory. Papert combined the power of the microcomputer with Piaget's idea about how children learn (Maddux, 1984). Papert (1980) contended that learning to program will influence the way children handle problems. He further maintained that the microcomputer and computer programming will provide the building blocks of concept development.

Although Papert agreed with Piaget on developmental stages in concept learning, he did not feel that learning is locked into a time schedule. Rather, he argued a child can travel through these stages of development by experiencing programming.

Therefore, Logo, produces the potential for higher level concept development at an earlier time in the child's life (Papert, 1980).

This theory of Papert's has been challenged since it is not in line with some of Piaget's hypotheses that indicate not even favorable intervention can cause children to deal with abstract thinking before the age of formal-operations (Clements & Gullo, 1984).

Research did show that children can learn to program and that programming is an effective tool for teaching the cognitive process (Papert, Watt, diSessa, & Weir, 1979). However, most of these studies have not dealt with young children. The study by Clements and Gullo did specifically examine the effects of programming on young children's cognition. The results indicated that programming increased some aspects of problem-solving ability and cognitive style, but it did not show any evidence that it affected cognitive development (Clements, et al., 1984).

Watt (1982) reported that Logo developed understanding of mathematical concepts, but did not necessarily cause measured improvements on standardized testing.

Burg (1984), a kindergarten teacher, expressed a strong opinion against the use of early exposure to programming. She reminded early childhood educators that children should not be expected to program since this process requires formal logical reasoning, which the kindergarten student does not possess.

Yet it has been reported that Logo is successful with young children because it is quick and easy to acquire the basic skills with which to do more complex and interesting things (Maddux, 1984).

The issue of programming in the early years is also addressed by Sherry Turkle in The Second Self: Computers and the Human Spirit. After observing children program, Turkle (1984) noted the different styles of handling the computer. She observed that styles of programming differed according to personality and stated that children should be given a chance to experience computers in their own way. Turkle divided programming style into two categories. Hard mastery follows a set plan; while, soft mastery is likened to the creative mastery of an artist. She stated that computer literacy in our schools will only be successful if teachers accommodate both styles. Rhodes (1985) called for sensitive educators to consider Turkle's position as providing new insight into the developmental process.

Computer assisted instruction includes drill and practice programs, programmed instruction or tutorials, and simulations or games. Such instruction works by providing a stimulus with the microcomputer. The user makes a response which is evaluated. The microcomputer then provides a reward which indicates a correct answer. The microcomputer keeps track of the responses and goes on to provide a new stimulus (Olds, 1985).

It is reported by Long (1983) that computer assisted instruction can provide a generalized form of learning for all students, or specialized programs for small groups, allowing for individualized progress.

Microcomputers have been used effectively to drill and practice concepts. A study of kindergarten children showed that a group of children who practiced concepts with the microcomputer performed better on certain math, counting, and phone number activities than six children who had not used the computer (Hungate, 1982). This study, as Hungate pointed out, is of great importance to the early childhood educator since it shows that young children can use the computer and learn from it. Piestrup (cited in Spencer & Baskin, 1983) also reported that the microcomputer was used successfully to drill and practice such concepts as above, below, and left, right. It should be noted that the microcomputer's success with drill and practice is further enhanced by the fact that it is a patient and repetitive teacher.

Programmed instruction is more involved than drill and practice since it provides feedback and additional instruction when necessary. Ideally the student does not leave the microcomputer with any wrong information and is given a number of opportunities to find the correct answer (Tipps & Sander, 1982).

Unlike drill and practice and programmed instruction which make use of much repetition and reinforcement, simulations

encourage the development of strategy. Video games are an example of this type of program and combine the successful use of strategy and manual dexterity.

When considering software, it should be noted that most of the software being designed for the early years involves drill and practice (Tipps & Sanders, 1982). McCrory (1984) reported that the software is poor. It does not take into account the physical limitations of the child at this period of his or her development. He continued to point out that many of the computer simulations require quick judgement and reaction time. Young children respond best to computer interaction which involves joysticks, small keypads, and touch tablets (Colker, 1983). Early childhood educators must be mindful of the fact that the best educational software for young children should ultimately come from those who truly know the young child--the educators themselves. McCrory (1984) recommends that teachers design software as they would curricula.

Research did show that educators of the young child have considered various ways of using the microcomputer. The limited amount of investigation in this area exphasized that early childhood educators must become increasingly more involved in discovering effective ways of using the microcomputer.

The Computer in the Kindergarten

Realizing that microcomputers are becoming as every day to most young children as television, and after considering that research does indicate that young children can and do learn from computer-related experiences, concerned kindergarten teachers must decide if the microcomputer can be used effectively in the kindergarten classroom. Research does indicate that this is possible. The microcomputer can influence the emotional, social, and cognitive developement of the kindergarten child. Kindergarten teachers who are genuinely committed to a child -centered curriculum can use the microcomputer to enhance the development of the total child (Burroghs, 1985).

Turkle (1984) reported that the stages of child development are intensified by computer related experiences and that the sense of mastery which the microcomputer offers contributes to the positive emotional development of the child.

The most important concept of self, which is emphasized in the first year of elementary school was enhanced by successful experiences with the microcomputer (McCrory, 1984). The sense of power young children experienced developed good feelings and increased self-esteem (Spencer & Baskin, 1983). Burg (1984) described a student who had the inability to speak clearly and desire to be alone. After successfully using the microcomputer, the child spoke more often and seemed happier in the kindergarten environment. Most children are not afraid to make a mistake

with the computer, even when they are afraid in class (Hungate, 1982).

Burg (1984) emphasized that teachers must design programs to meet individual needs and to insure success in order for the microcomputer to be effective in building strong self images. Programs can be tailored to fit a particular child (Mullan, 1982).

The microcomputer motivated children to learn, and built enthusiasm about the process of learning (Spencer & Baskin, 1982). Even those with short attention spans were motivated (Wayth, 1983). These factors contributed to successful experiences with the microcomputer, and thus the development of positive self-concept.

The social development of children was influenced by the microcomputer. Mutual consulting and collaboration were reported when computers were used in a buddy system (Spencer & Baskin, 1983; Burg, 1984). Wayth (1983) stated that interaction with another at the microcomputer stimulated language development, as the child learned to work with another in a cooperative effort.

Although the child-teacher relationship is firmly established in kindergarten, it is the goal of kindergarten teachers to develop a child who is secure and confident (Holloway, 1982). The microcomputer has proven to be a tool in encouraging independence. Papert (1980) stated that as the child uses the microcomputer, he depends more on his own thinking process. He is better able to follow directions and to work on his own

(Clements et al., 1984).

Burg (1984) stated that the microcomputer furnished children with developmentally appropriate learning experiences. These experiences were actually intensified by computer related activities (Turkle, 1984). It was reported that the microcomputer was used effectively to enhance the learning of numbers, letters, words, shapes, colors, sounds, amounts and other concepts (Burg, 1984).

Kindergarten teachers reported that computers were successful at encouraging divergent thinking (Burg, 1984). Green (1982) proposed that students who are exposed to microcomputers early in life will go on to pioneer new ways of thinking. Programming is a problem solving technique which influences the way children think (Papert, 1980). Logo has been reported to increase understanding of concepts (Watt, 1982) at this level of development. It is suggested that Logo allows the microcomputer to become a part of kindergarten play, which is the fundamental way children learn in kindergarten. With four commands a child can control the computer. A kindergartener can learn to push the proper keys to move the triangle on the screen, (referred to as the Turtle), to form geometric shapes. Even before actual work with the microcomputer, the child has explored distance and directionality with body movement and a floor toy (Tipps & Sanders, 1982). Exposure to Logo invites the kindergartener to become a

generator of information, rather than only a consumer (Hoot, 1983).

Research indicated that the kindergarten teacher who seeks to meet the emotional and social, as well as the cognitive, needs of the child can well employ the microcomputer in his or her learning environment. The integration of the microcomputer places one total learning environment within the bounds of another environment that teaches (Olds, 1985). The microcomputer is a powerful tool (Koegh, 1982) which, when used sensitively, provides experiences which touch upon the requirements of the individual child.

Summary

The new technology is found today in all aspects of American life. Schools are now well equipped with microcomputers and research does show that they are being used effectively. Early childhood educators have examined possible roles for the microcomputer in the learning environments of the young child. Studies showed that the microcomputer can be used effectively in kindergarten to meet the needs of the total child.

Chapter Three

Conclusions and Recommendations

It has been the purpose of this study to show the impact of today's technology on education even in the early years, and to consider how the early childhood educator might intergrate the microcomputer into the kindergarten curriculum.

Conclusions

The review of the literature concerning the microcomputer in education demonstrated that American schools are becoming well equipped with the apparatus necessary to teach the new technological skills. The research indicated that the problem which educators are confronted with today is deciding how to effectively use the microcomputers in the classroom. Early childhood educators are becoming involved in making this decision. Kindergarten teachers who have long been defenders of the developmental learning environment of the young child are finding a place for the microcomputer in their classrooms. The research is limited, but there is evidence of kindergarten teachers using the microcomputer to enhance the social, emotional, and cognitive development of the child. Most of the articles reviewed called for early childhood educators to become actively involved in considering the microcomputer in the classroom and in developing appropriate software. The study showed that the microcomputer was being used to build self-esteem, practice social skills, develop motor

coordination, encourage independence, and to provide drill and practice of concepts. The research did show that some kindergarten age children are being taught to program.

While most early childhood educators agreed the microcomputer could be used in the kindergarten classroom, programming was the one issue that did surface. Some research indicated that five year olds were developmentally too immature to program. While other research supported exposure to programming, particularly Logo.

Nevertheless, despite the controversy over programming and the limited number of actual comparative studies, the literature reviewed in this study does conclude that kindergarten teachers can effectively use the microcomputer as a tool in meeting many of the individualized needs of the total child.

Recommendations

After carefully reviewing the literature and using the microcomputer in a kindergarten classroom for the past two years, the following recommendations are presented for early childhood educators to consider.

Early childhood educators must become computer - literate. It is recommended that courses designed for teachers become a fundamental part of teacher-preparatory and in-service programs. These courses should be workshops which emphasize process, using hands-on experiences with the microcomputer. They should not only

demonstrate how the microcomputer works but these courses of study should stimulate questioning and discussion as to how teachers can use the microcomputer in the classroom. When educators complete such a course they should feel confident and enthused about using the microcomputer.

Teachers of the early years must continue to keep informed about technology in the classroom by reading current books, journals, and magazines which are computer-related. Every early childhood educator should read Papert's Mindstorms: Children, Computers, and Powerful Ideas and Turkle's The Second Self: Computers and the Human Spirit and subscribe to at least one journal concerning microcomputers in education.

Teachers should also meet in support groups, made up of fellow early childhood educators, to periodically share ideas, software, and program designs. It is of the utmost importance that teachers of the young child make informed decisions when considering how to use the microcomputer in the kindergarten. By reading and collaborating, educators will become confident and skilled users of the microcomputer.

It is also proposed that the kindergarten teacher who is committed to meeting the personal needs of each child use this tool to help record the wealth of information such a teacher must keep track of, by creating a managerial system using the microcomputer. This will free the teacher from time-consuming

paper work and will be a tremendous aide in assessing individual needs.

The microcomputer should be used as a stimulus in developing the social, emotional and cognitive needs of the child and should be integrated into all areas of the curriculum. Once assessed, the kindergarten teacher should use the microcomputer in meeting the special needs of the child.

If a need for the development of social skills is observed the teacher should arrange for a buddy-system at the microcomputer by assigning students in pairs. One student could actually be working the computer while the other stands by helping and offering encouragement. Programs should be designed where each child controls the computer with joysticks. This encourages turn-taking as well as cooperative effort. Always encourage talk at the microcomputer and the sharing of ideas.

The microcomputer can also help to meet the need for more independent experiences. In such a case, the teacher should design a program with explicit and easy to follow directions so that the student could spend time working alone and making independent choices.

Every child needs to experience positive learning experiences in kindergarten and the microcomputer can be a powerful tool in enhancing self-concept. It is recommended that programs used to drill and practice concepts be designed to guarantee success

at the microcomputer. The programs should offer a variety of presentation in order to hold and increase the students attention. Early programs could deal with letter and number recognition, while developing keyboard and motor skills. Color computer games designed by the Children's Workshop of New York City are an excellent example of developmentally appropriate software and should be considered.

Games on the microcomputer should be designed to motivate and stimulate creativity, but also be used to encourage cooperation through the use of rules. The microcomputer should also be used to provide art experiences through activities which involve graphics.

Kindergarten teachers should consider programming in the fashion of Turkle. Each child should feel comfortable with the microcomputer and not be forced into any painful experiences. For those who do feel at ease with programming, Logo is an easy to learn programming language which encourages the development of thinking skills and creativity, and should be introduced. The microcomputer should definitely be used to encourage problem-solving abilities, and programming provides such experiences.

The microcomputer can be particularly helpful to the slow-learner in almost any sector of the academic curriculum. It is a machine of great patience and offers a number of opportunities for repetition. Yet, the microcomputer never becomes

annoyed at having to repeat a rule over and over again. So, if a need for repetition is assessed, the microcomputer is a tremendous help to the kindergarten student--and teacher.

It is advised that the kindergarten teacher model appropriate behavior in regard to the microcomputer. The kindergarten teacher should be comfortably and enthusiastically using the microcomputer as a tool in all areas of teaching. In so doing, the kindergarten student will consciously, as well as unconsciously, use the microcomputer as a successful source of learning and as a mechanism for building a stronger self-concept. The microcomputer will thus blend, very effectively, into the patchwork of positive kindergarten experiences.

In conclusion, the microcomputer can be successfully used in the kindergarten when the teacher accepts the microcomputer, not as an unfeeling machine, but as a tool that can be used with sensitivity to meet the needs of the young child.

Summary

This study has shown that microcomputers are a part of the educational process and should be integrated into the early childhood curriculum. Through the use of professional articles and current books on the microcomputer in education, it has been indicated that microcomputers are effectively being used in today's classrooms, even within the kindergarten curriculum.

The conclusion of this study is that the microcomputer should be used in the kindergarten classroom as a tool to help meet the social, emotional, and cognitive needs of the young child.

The sensitive kindergarten teacher must decide how to use the microcomputer on an individual basis, since it is the finding of this study that there is no one way of effectively employing the microcomputer within the kindergarten curriculum. The microcomputer provides a wealth of possibilities, and kindergarten teachers are encouraged to use this powerful machine in an informed and caring way.

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