THE EFFECT OF A MICROCOMPUTER ON PRESCHOOL CHILDREN'S SELECTION OF INTEREST CENTERS

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1970

Submitted to the Faculty of the Graduate College
of the Oklahoma State University
in partial fulfillment of the requirements
for the Degree of
MASTER OF SCIENCE
May, 1987

THE EFFECT OF A MICROCOMPUTER ON PRESCHOOL CHILDREN'S SELECTION OF INTEREST CENTERS

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PREFACE

Microcomputers are the newest technology to enter the classroom of today's schools. Research is just beginning to be conducted concerning the use of these machines and their effect on the classroom. Many educators are questioning the use of these machines at the preschool level. This study is concerned with the effect the addition of a microcomputer interest center to a prekindergarten classroom will have on the children's selection of other interest centers in a developmental preschool classroom. Another objective of the study is to note the usage of the computer according to gender.

I wish to express my sincere appreciation to my major adviser, Dr. Frances Stromberg, for her continual guidance and support throughout this study. Appreciation is also extended to other committee members Dr. Arlene Fulton, Dr. James Moran, III, and Miss Mona Lane for their encouragement.

I am also thankful for the parents, teachers, and children who participated in this study; to the students of the advanced Child Development courses who volunteered their time to record observations; and to Chris Ronnigen-Fenrich for her suggestions and guidance in selecting software programs appropriate for a young child.

A special thank you is due to the IBM Company for the use of two IBM PC Junior Microcomputers, two color monitors, two disk drives, and two printers. Their desire to promote research at Oklahoma State University

made this study possible.

Finally, this thesis would not have become a reality without the constant love, patience, understanding, and support of my husband, Jim, and my three sons, Ken, Scott, and Paul.

TABLE OF CONTENTS

Chapter Page

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Interest in the microcomputer has multiplied in the past five years. The number of microcomputers in schools alone has "increased almost twentyfold in just three years, from 33,000 in June of 1981 to 630,000 by June of 1984" (Chen, 1985, p. 37). Many people consider the use of computers to be a fairly new phenomenon. However, computers have been affecting our lives since 1946 when ENIAC went into service. This "electronic giant . . . weighed 30 tons, filled 1500 square feet of space, used more than 19,000 vacuum tubes, and required a special air-conditioned room because of the heat it produced" (Ziajka, 1983, p. 61). Today's "electronic giant" can handle as much data as ENIAC but can be set on a desktop and is available to every household or school system as well as to research laboratories and businesses. The invention, in 1971, of the microprocessor chip has made possible the development of small and relatively economical microcomputers (Ziajka, 1983).

So revolutionary has been the movement to microcomputers that some are comparing it to the Industrial Revolution of the early 1800's. Winkle and Mathews (1982) so stated in the Phi Delta Kappan, "as the Industrial Revolution augmented the muscle power of humankind, the Computer Revolution increased the mindpower of humankind" (p. 314).

Statement of Problem

As more and more computers become available to the general public and educational systems, the controversy surrounding the microcomputer and its use with children has been rising. Demetrulias (1985) reacts to Seymour Papert's LOGO flowers, birds, and motion in this way:

> . . . but it [the computer] is perceptually extremely impoverished. No smells or tastes, no wind or birdsong (unless the computer is programmed to produce electronic tweets), no connection with soil, water, sunlight, warmth, no real ecology (although primitive interactions with a computerized caterpillar might be arranged) (p. 12).

A behavioral optometrist feels "the computer will be the newest and most potent contributor to early, extreme nearsightedness in children who drive themselves to mastery of it" (Getman, 1983, p. 521). A third opinion is stated by Seymour Papert (1980), author of Mindstorms: Children, Computers, and Powerful Ideas and developer of LOGO, a computer program designed for the preschool child. He states, "Its essence is its universality, its power to stimulate. Because it can take on a thousand forms and can serve a thousand functions, it can appeal to a thousand tastes" (p. viii).

Subjective opinions are being formed by educators reflecting the potential value of a microcomputer in an educational setting. Helen Cuffaro (1984) compares the computer to a workbook in this manner:

> Their [workbooks] diversity has not modified criticism of them as being, all to frequently, uninteresting and unchallenging in their standardization, and mindless, repetitious, and stereotypic. Putting them in motion (as in computers) does not redeem them (p. 562).

Papert (1980) causes concern among educators when he states:

> Schools as we know them today will have no place in the future. But it is an open question whether they will adapt by transforming themselves into something new or wither away and be replaced (p. 9).

These opinions are causing a polarization among educators and are reaching the early childhood education and preschool disciplines as well. There is little empirical evidence concerning young children's use of this equipment and of the effect the use of this equipment may have on children.

Research is needed to identify potential effects the addition of a microcomputer into a preschool classroom may have on the children and/or the environment of the classroom. How does this addition affect the children in the classroom? Do the children flock to use it as they do to any other new addition? If so, does this intense interest then wane as the microcomputer becomes integrated with the other interest/activity centers? Will the microcomputer offer the flexibility and creativity found in the other interest centers of a developmental preschool? What effects will the microcomputer have on the children's selection for their area of involvement? Will one gender use the computer more than the other? These are questions that need to be answered.

Purpose of the Study

The major goal of this research study was to examine the results of introducing a microcomputer interest center into a developmental preschool environment, particularly the effect on interest center selection by the children in the preschool setting. Little research has been done

in this area, and few studies have concentrated on the introduction of a microcomputer to the classroom environment.

Research Questions

The following research questions have been identified for this study:

1. Will the introduction of a microcomputer as an interest center into developmental preschool curriculum influence the use of other centers initially or over a longer period of time?

Prediction: A new, attractive activity will draw much use initially therefore decreasing use of other centers, but use of the computer center will decrease over a period of time. It is not known how much decrease or how long before one can expect a decrease.

2. Will the use of the computer center be associated with a) use of other centers or b) sex of user?

Prediction: a) Those centers which are similar to the computer such as the art, small manipulatives, and library/listening centers will show a decrease in their use; while, centers such as the blocks, climbing, and dramatic play centers will not show a variation in their usage. b) Boys will be more likely to use the computer than will girls.

General Hypotheses

Specifically, the following general hypotheses have been developed for this study:

1. There will be no significant difference between use of various classroom interest centers by a group of prekindergarten children and the availability of a computer center.

2. There will be no significant difference between sex of child and availability of a computer center and use of various classroom interest centers.

3. There will be no significant difference between use of a computer center and use of various other classroom interest centers after the computer has been available for 1, 4, and 8 weeks.

Assumptions and Limitations

During this study, it was assumed that the teachers would not change their philosophies and methods of teaching due to the addition of a microcomputer to the classroom. It was also assumed that the children's behavior would not be altered due to the presence of observers recording data for this study. The subjects for this study were attending a university laboratory preschool. The presence of adults observing from screened observation booths was not unusual.

Conclusions from this study are limited to preschool children who are similar to the subjects in this study. These subjects ranged in age from four to six years, attended an university-supported laboratory school with professionally trained teachers, and came from well educated, two-parent homes. Generalizations from this study must be limited also due to the small number of subjects.

It should be noted that the microcomputers were limited to two IBM PC Juniors and the software was limited to four commercial programs selected from the small number of appropriate programs available for the IBM PC Junior. The microcomputers were available to the subjects during the morning self-select time for an eleven-week period. The self-select time was approximately one and one-half hours long. Each subject was

allowed up to 15 minutes to use the microcomputer. If no other subject desired to use the computer, the first subject was allowed to continue the use of the microcomputer.

Definition of Terms

To facilitate understanding, definitions of terms used in this research project are presented in this section.

1. Preschool child - a child who is three years or older but who has not yet entered kindergarten.

2. Microcomputer - a small computer designed primarily for use in the home, school classroom, or business.

3. Program - a set of step-by-step instructions that tells the computer what to do. A program is generally developed by programming specialists and available for purchase on a software disk.

4. Interest center - an area within a preschool environment which allows a child to explore activities appropriately related to the child's interest and developmental level.

5. Microcomputer center - an area in the classroom which was furnished with two IBM PC Junior microcomputers, two color monitors, two disk drives, and two black and white printers along with four commercial software programs.

6. Block activities - activities which include: a) the unit block center, an area providing small wooden unit blocks which allow for a variety of learning including development of mathematics and space concepts, creativity, visual discrimination, and motor control; and b) the hollow block center, an area equipped with large wooden hollow blocks

used to foster creativity, dramatic play, and motor control, as well as an understanding of space and balance.

7. Library/Listening - activities that include: a) the library center which provides books and other materials designed to encourage listening skills, socialization, and an interest in reading, and b) the listening center which focuses on the development of listening skills through the utilization of 2-3 headsets with a tape recorder or phonograph.

8. Art center - a center which provides graphic and/or plastic art materials and encourages creative expression in conjunction with the development of fine motor skills, eye-hand coordination, and independence in working.

9. Discovery activities - activities which include: a) the science center, an interest center which introduces various science concepts through observation and exploration, and b) the manipulative center, a center which provides materials that will aid in the understanding of concepts and encourages verbal expression of these concepts, as well as offering opportunities for developing fine motor control and eye-hand coordination.

10. Dramatic play activities - two areas in the classroom designed for dramatic play especially acting out roles of family and community.

11. Gross motor center - an area equipped with apparatus to encourage development of gross motor coordination.

12. Water/sand table - a table that will hold water or other media such as sand, rice, beans, for example, which allow for the development of motor skills, perceptual problem-solving of simple scientific principles, and creative expression. The table is 46" long, 20" wide, 24"

high, and 6" deep. Various items such as measuring cups, clear plastic tubes, miniature people, and other accessories are added to the media to enhance experiences.

CHAPTER II

REVIEW OF LITERATURE

Each year more and more microcomputers are being found in homes, businesses, and schools. These machines have become incorporated into our everyday lives by processing information quickly and efficiently. Microcomputers can be found in grocery stores, banks, and factories: in cars, radios, and wristwatches.

However, interest in a machine that can calculate and process information is not new. Charles Babbage invented a calculating, steam-driven machine in 1833. This device was programmed by machine cards and was intended to do various mathematical calculations. This machine was the forerunner of the present day computer. In 1946, an "electronic giant" called ENIAC was put into service. ENIAC was energized by 19,000 vacuum tubes which created such tremendous heat that the computer had to be placed in a specially air-conditioned room. In the late 1950's, transistors were invented and replaced the vacuum tubes. These transistors were smaller and allowed the computer to become refrigerator-size. However, the invention of the microprocessor chip in 1971 allowed for the development of the microcomputer. The microprocessor chip is as small as an infant's fingernail, therefore allowing a microcomputer to have the capacity of the computers of 30 years ago and yet be small enough to be placed on a desk (Ziajka, 1983).

This large capacity in such a small device has allowed microcomputers to be available almost everywhere. They are in our banks, in our grocery stores, and at our gasoline stations. As Stevens (1984) points out, "the evidence is overwhelming to indicate that computer technology is making a major impact upon our society" (p. 376). Jorde (1985) adds, "the computer has been hailed as the most significant advance in the history of civilization, an indispensable adjunct to daily life" (p. 15). Lepper (1985), however, cautions about our over-enthusiasm for the newest technology in this manner,

> . . . technological changes frequently have important social and psychological consequences . . . Again and again in this century, we have seen major shifts in social patterns and cultural values that have followed from the introduction of technological innovations" (p. 1).

Lepper reminds us the primary use of the technological advances may be worthwhile, but we must not forget that the secondary consequences may not be as meaningful. He cites the example of television. Not only did society acquire the television, but the invention also led to "the rise of the advertising industry and the creation of the football widow and TV dinners" (p. 1). The invention of the gasoline engine not only created the automobile industry along with the rubber and oil industry but also super highways, smog, and, possibly, the decline of extended families.

The invention of the microcomputer has caused concern in our schools. Administrations are rushing to put the computer into the classrooms. Credentialing agencies and institutions preparing future teachers are requiring evidence of "computer literacy." The pressure to expose this generation to the new technology of the computer is great. Research

is being conducted in various studies but not enough information has been gathered to form any substantial conclusions. Bowman (1983) recalls Sir Alex Clegg's caution when he was discussing the open classroom nearly two decades ago in this manner, "A good idea becomes a cliché, leads to a bandwagon, and ends in disaster" (p. 57-58). The same concern is expressed by Stevens (1984),

> If carefully considered approaches to change are not followed and if the computer becomes another bandwagon farce, it is very likely that the educational concept of microcomputers will be added to that educational landfill as failure is perpetrated within our schools (p. 373).

The American classroom is presently "jumping on the bandwagon." If society does not want the microcomputer to end in disaster, more research will need to be conducted.

Many opinions are being formed both in support and in opposition of the computer. Karen Burg (1984) first viewed the prospect of microcomputers in her kindergarten classroom "as an invasion of the enemy--the behaviorist's final victory." She felt she would lose her battle for individualism, spontaneity, and freedom. She equated the microcomputer with a "Skinnerian box" (p. 29). Seen from a different perspective, Tipps and Mann (1983) stated that to watch a child work and play with a computer was affirmation of Piaget's "joy in being the cause" (p. 15).

What are some of the concerns educators have of the computer? Academic Therapy ("Pros and Cons," 1983) surveyed its subscribers asking for their positive and negative feelings toward the computer. The respondents felt strongly that computers were highly motivating and encouraging and that some students respond to the computer with more enthusiasm than they do to teacher's praise. Also they felt computers

allowed for immediate feedback to students. Most of the computer software programs were positively geared so that the student was rewarded for progress. The educators believed this positive feedback helped raise the child's self-esteem without tangible rewards. On the negative side, the respondents believed computers were "too expensive for many special education departments. Cost is also high for repairs and for software" (p. 537). In addition, they perceived that the computer requires "excessive teacher time to (1) learn to operate and program, (2) teach students to operate, and (3) develop programs" (p. 538).

Computers and the Preschool Environment

The desire for microcomputers in the classroom started in the secondary schools and colleges. In recent years, computers have been added to the primary grades and even into the preschool classrooms. The question is frequently raised concerning the microcomputer in the preschool environment. Is it too soon to introduce the microcomputer? Should children before the age of five years be exposed to the microcomputer? Barnes and Hill (1983) are among those educators who feel a preoperational child is not ready for the symbolism and abstractions presented by the microcomputer.

Before answering the question concerning the appropriateness of placing microcomputers in the preschool, one must examine the preschool environment. The literature review reported for this study will be limited to those generally characterized as "developmental."

The developmental preschool classroom is an open classroom. It is a place where children are allowed to explore and to manipulate their environment. Clare Cherry in her book, Creative Play for the Developing

Child (1976), states, "We provide an environment rich in materials, choices, space, time and guidance, one that is geared towards meeting the varying needs of individuals as they occur from moment to moment, hour to hour, day to day" (p. 14). Joanne Hendrick (1984) believes "young children learn best when they can manipulate material, experiment, try things out and talk about what is happening as it takes place" (p. 19). James L. Hymes, Jr., (1968) supports these ideas when he said, "Three-, four-, and five-year-olds are more likely to respond to what they can see and touch and use. They are more apt to become involved in whatever crosses their path in some noisy, active, functional fashion" (p. 106). He believes a good classroom allows the children to seen their "small world as a part of a universe of never-ending mystery." Hymes goes on to say that "sound programs provide experiences in literature and music and art, in the sciences and in mathematics, in the social sciences. They provide experiences in health and in physical education" (p. 3).

The preschool classroom provides the child with the opportunity to develop all the areas of his or her self: the physical self, the emotional self, the social self, the creative self, and the cognitive self (Hendrick, 1984). In a developmental preschool, this opportunity to develop oneself is often encouraged with the use of interest or learning centers; areas which serve as places for "experimenting with new materials, allowing for pupil self-selection . . . and encourages the use of all types of instructional materials" (Osborn, 1980, p. 159). The teacher is available to the children, but her teaching is done indirectly. The teacher sets the stage for learning by the variety of materials she provides and the range of experiences that are made possible for the

children (Read, 1976). Joanne Hendrick (1984) best sums up the goal of a preschool program in this manner:

> Children learn most easily by means of actual, involving experience with people and activities. This is best accomplished in an open, carefully planned environment where children must take responsibility and make decisions for themselves and where they have ample opportunity to learn through plan (p. 8).

The question then is presented, does the addition of the microcomputer lend itself to the goals and philosophy of the developmental preschool classroom? There is a fear among some Early Childhood Education professionals that "the computer appears as a threat to that right to play. They envision scenes of preschoolers, row after row, like corporate typists, bound to their computers" (Taylor, 1983, p. 7). Nursery schools and day care centers will still need to provide the enriched environment that would follow the goals and philosophies of the developmental classroom. During an interview (Long, 1982), Ronald Palamara advocated that the preschool level was the time to introduce computers because young children are "inquisitive and open to new concepts" (p. 312). Paisley (1985) believes children are not as threatened by computers as adults are because in the child's world everything is new and exciting. The computer is just another new element to be explored in the child's environment. "Ample evidence," according to Williams (1984), "indicates that most of a child's learning occurs during the early years" (p. 40).

The computer allows each child to think at his or her own speed and level. Preschool children enjoy repetition. The computer will repeat and never go tired of it. As L. P. Campbell (1984) points out, "It

treats all students alike. It waits for the slower learner, yet bounds ahead quickly for the brighter student. When a student uses a computer, he competes with his past achievements, not with other students" (p. 332). A computer, therefore, can foster self-esteem by allowing a child to work at his or her own pace.

However, will the use of the computer and concepts presented through its use, be carried over to other activities in the preschool program? The staff at the Living-Learning-Laboratory for Young Children at Ball State University in Muncie, Indiana, made several informal observations concerning this. They noted the children recognized more letters and numerals on labels, charts, and language-experience stories than had children in previous lab groups. The children also demonstrated an understanding of same and different in many situations during the school day (Williams, 1984). "The children knew colors and shapes in situations removed from the computer, suggesting a transfer of knowledge" (p. 42). Similar observations were also made by Burg (1984) and Ziajka (1983) where they saw evidence of computers programmed with developmentally appropriate experiences for cognitive development (p. 31) and fine motor skills with eye-hand coordination (p. 66).

The argument is presented that when a microcomputer is introduced into a preschool environment, the "inherent attractiveness of computers and their immediate reinforcement schedules will cause children to gravitate towards computers to the detriment of other areas of social and cognitive development" (Barnes and Hill, 1983). Lipinski et al. (1986) observed, after introducing a microcomputer to a preschool classroom, that "the attraction to the microcomputer outlived the novelty effects. Interacting with the microcomputer was an attractive, but not engrossing

activity for these preschoolers" (p. 164). They found that as time passed and the microcomputer lost its newness, the activities in the classroom returned to their original levels. "Overall, the results suggest that the computer initially disrupts other free play areas in the preschool classroom but that in general, children return to baseline levels over time" (Lipinski et al., 1984, p. 10). In two groups studied, these investigators found only one play area in each did not return to the original baseline. In one, the drama area remained low as did the art area in the other study. These studies would indicate that the concern of Barnes and Hill that the computer would attract children to the detriment of other areas of social and cognitive development would have little foundation.

Social Interaction

When one first thinks of a computer in a classroom, an image of a lone child sitting at a terminal keyboard looking at a television screen is envisioned. A sense of isolation and passiveness is seen. This has concerned both educators and parents alike. However, this concern is unfounded. Several studies have shown that instead of isolation and passiveness, the computer area has shown that most children prefer to work at the computer with another individual (Rosengren, Gross, and Abrams, 1985; Tan, 1985; Greenfield, 1984; Nida et al., 1984; Clements, 1985b). Dickson, a professor of child and family studies at the University of Wisconsin, confirmed these findings, "we found computers to be at least as good and probably better at encouraging social interaction, like talking and sharing, than many other preschool activities" (Brynildson, 1986, p. 9). He encouraged socialization by placing two

chairs at the microcomputer instead of one. Dickson felt that "the key to whether computers stimulate or discourage socialization is adult guidance and supervision" (Brynildson, 1986).

Researchers have been seeing open sharing of ideas around the computer. Instead of isolation, the computer has become a gathering place. Ziajka (1983) was surprised to see the "amount of social interaction generated by the microcomputer . . . The children usually worked in pairs, or even small groups, with the microcomputer at an interest center" (p. 66). Williams (1984) felt the computer

> . . . seemed to produce social outcomes such as sharing, taking turns and other helpful behavior . . . Children not using the computer encouraged and praised the child who was working on it with comments such as 'That's right' and 'Good!' (p. 42).

Computers seem to be encouraging a fellowship in the classroom instead of the isolation so feared by the educators and parents.

Gender and Computer Usage

Concern is also being expressed in regards to the possibility of males being the dominant users of the microcomputer. Demetrulias (1985) reported that the percentage of students who use microcomputers in schools decreased substantially from the grade schools to senior high school level. Male users also exceeded the female users (p. 134). He felt the unequal usage of the microcomputer by males could be seen in the National Education Association study of computers which reported,

> 73% of the teachers who did not use computers were female. Fifty percent of these were elementary school teachers. Because most teachers at the elementary level are women, this could suggest gender differences (p. 133).

However, when observing the preschool classroom, researchers are finding mixed reports as to gender usage. Klinzing (1985) observed that at the beginning of play time, boys would rush to the computers leaving the girls to find something else to do. When the computers were free, the girls would not leave their activities to go to the computers. Thus creating the effect that boys used the computer more than girls. Lipinski et al. (1984) found girls (21%) spent significantly more time at the computer than boys (11%). However, Nieboer (1983) found that "both males and females interacted equally with the computer" (p. 20). Sprigle and Schaefer (1984) observed that gender had no significant effect on the use of the computer (p. 249). Lipinski et al (1984) came to the same conclusion made by Muller and Perlmutter (1984) "that the early years may be an excellent time to introduce computers in order to promote equal comfort with this technology for boys and girls" (p. 17).

Summary

The microcomputer is not the all-encompassing answer to education; nor is it the evil destruction of education. It should be viewed as another wonderful tool to introduce children to concepts. As Karen Burg (1984) reacts to the computer, ". . . all educational tools are value-neutral. They can be used to promote divergent thinking or conformity, freedom or restriction, self-confidence or fear" (p. 30).

Preschool children are seekers of knowledge. One of their greatest joys is discovering something, anything on their own. They "are curious, inventive, and purposeful learners who use whatever is in their environment. And computers are a new element in the environment with which children can interact"

The environment for a preschool program at one time consisted only of Froebel's "gifts and occupations" (Osborn, 1980, pp. 48-57). Later, Patty Smith Hill expanded Froebel's ideas by designing larger blocks, and Alice Temple added larger dolls, a playhouse with furniture, and household items (Osborn, p. 106). Just as these educators have enhanced the preschool program with new materials, cannot the microcomputer join these areas of interest as another way for children to explore their environment?

Educators need to keep an open mind. Douglas Clements (1985a) writes, "Used appropriately, [computers] can contribute to the development of young children" (p. 9). Educators of young children need to hear both the positive aspects and the warnings against the use of the microcomputer. Karen Sheingold (1984) concludes in this manner:

> The microcomputer is not one thing or one kind of experience for young children or anyone else. Its flexibility presents a great challenge to our imaginations. The challenge is to determine whether and how the microcomputer can be made interesting, appropriate, and useful for young children (p. 5).

The educational system needs to meet this challenge.

CHAPTER III

METHODS AND PROCEDURES

The main goals of this project was to examine the results of introducing a microcomputer into the preschool classroom environment and particularly the effect on interest center selection by the children. This study was conducted as a descriptive research project based on observation of the behavior of 18 children over a period of 11 weeks.

Subjects

The subjects chosen for this study were from the Prekindergarten Classroom (an all-day program) in the Child Development Laboratories on the Oklahoma State University campus in Stillwater, Oklahoma. The group consisted of nine boys and nine girls between the ages of 4 years, 9 months and 6 years, 1 month as of January 1. These children came primarily from two-income families with parents who were employed as university professors, public school teachers, medical professionals, self-employed business owners, or university students. Two of the children came from single parent homes where the fathers had no contact with the children. The fathers ranged in age from 25 years, 8 months to 59 years, 6 months with the average being 36 years, 5 months. The mothers ranged in age from 24 years, 11 months to 40 years, 6 months with the average being 33 years, 2 months. Nine of the children were the youngest, 7 were the oldest, and 2 were only children in their respective families.

Apparatus

Microcomputers

Two IBM PC Junior microcomputers were used. These computers were on loan from the IBM Company to the Family Relations and Child Development Department at Oklahoma State University for use in an educational and research-oriented laboratory. Having two microcomputers available for use was important for two reasons. Previous studies with microcomputers by other researchers had used only one microcomputer. Also, children often enter an interest center because a friend is already in that center. Therefore, with two microcomputers in the microcomputer center easier availability was provided as well as similarity to the other centers in the classroom. The IBM Company also provided two color monitors, two disk drives, and two black and white printers. The equipment was placed on a child-sized table near the art center and the library center. Care was taken to locate all electrical cords and switches behind the computers. This would allow the cords to be inconspicuous and out of reach of the children. The center was located in an area not usually used for vigorous physical activity such as running and jumping. Three child-sized chairs were provided at the center.

Software

Although there were many software programs available for the preschool child, a limited number of programs were available specifically for the IBM PC Junior microcomputer. The researcher reviewed many of the software programs and consulted with an educator from Tulsa, Oklahoma, who worked with preschool children and microcomputers, for her

recommendations of appropriate software. The following criteria were considered when evaluating the software programs:

1. The suitability of the program for the developmental level of a 4 - 5 year old child.

2. The ability to allow the child to be creative.

3. The ability to provide positive reinforcement (smiling face, cheerful music) and to avoid negative reinforcement (loud buzzes, sad face) for incorrect responses.

4. The capability of the program to go from simple to difficult depending on the child's individual ability.

5. The capability of a computer-assisted instruction (CAI) program to introduce the concepts of above/below, same/different, colors, numbers, and letters.

6. The availability of a menu that would allow a child to make his or her own selection.

7. The immediate availability of software programs for the IBM PC Junior microcomputer.

The four commercial programs used were "Delta-Drawing" by Spinnaker, "Early Games for Young Children" by Springboard, "Juggle's Rainbow" by Learning Company, and "Alphabet Zoo" by Spinnaker. These programs were purchased, given on loan from the University Computer Center, and/or borrowed from parents who also had IBM PC Junior microcomputers at their home.

Research Hypotheses

Specifically, the following research hypotheses were developed for this study:

1. The use of various classroom interest centers by a group of prekindergarten children will not change when a microcomputer center: a) is introduced, b) has been available for 4 weeks, and c) has been available for 8 weeks.

2. The variables of sex of child and observational time period (Baseline, Week 2, Week 5, and Week 9) will not be related to use of interest centers separately or as an interaction.

3. There will be no significant difference between the use of a computer center and the use of various other interest centers available in Weeks 2, 5, and 9 of the program providing a computer center in a prekindergarten classroom.

Data Collection

Introduction of Microcomputer

Before the two microcomputers were introduced to the classroom, an introductory letter and a background information questionnaire were sent home to the parents (Appendix A). Also included in the letter was a parent permission/release form for the parents to sign allowing their child to participate in the research project.

In early February, two IBM PC Junior microcomputers were placed in the prekindergarten classroom. Because the children had been on vacation for Christmas and semester holidays, the microcomputers were not immediately placed in the classroom when the children returned. It was felt the children needed time to reestablish themselves in the environment before a new apparatus was introduced. The microcomputers were set up by an IBM representative during naptime for the children on a Friday

afternoon. The microcomputers were placed in a low traffic area to prevent any accidents caused by tripping over cords or running into chairs. Electrical cords and connections were placed behind the microcomputers and under the tables, out of reach of the children.

The following Monday morning the microcomputers were introduced to the children during the first group time. A puppet named "Patty Computer" was used to introduce the parts and instructions for use of the microcomputer. Through a flannelboard and the puppet, the following terminology was presented to the children: keyboard, monitor, disk, diskette, disk drive, printer, cursor, return key, and menu. These terms were used during the rest of the semester in reference to the computer. The children were also instructed concerning the proper care of a microcomputer. These instructions were given:

1. Wash your hands before using the microcomputer.

2. Be sure to eat all your snack and drink all your juice before using the microcomputer. Liquids and food are not good for the microcomputer. They will cause the microcomputer to stop working.

3. If the red light is blinking on the disk drive, ask a teacher for help.

As many of the children were excited about using the microcomputer, the children were asked to indicate their names on a special sign-up sheet which was attached to a decorative clipboard. The children were allowed to use the microcomputer up to 15 minutes at one sitting. The child was permitted to place his or her name again when the child had finished. The microcomputers were available for 90 minutes each day during the morning self-select period. The microcomputer interest center remained available for 11 weeks. The microcomputers were removed from

the classroom 2 weeks before the prekindergarten classroom concluded for the summer vacation.

Observations

During the current study the prekindergarten classroom had 12 interest centers available for the children to use in the self-select period. These interest centers included: 1) housekeeping center, 2) gross motor center, 3) water/sand table, 4) library center, 5) listening center, 6) table manipulative center, 7) art center, 8) science center, 9) unit block center, 10) hollow block center, 11) microcomputer center, and 12) small group room (often used for dramatic play). Each of these interest centers was designed to be attractive and to present activities within the capabilities of the children. Each child was allowed to select the activity he or she wanted as long as the center chosen was not full. The child would know the limitations of a particular center by observing the population sign posted for that center. Each child was allowed to come and go as the child desired. The centers were designed to give the child the opportunity to discover and explore the materials made available in each of these areas.

The major emphasis of this research study was to note any significant changes in the amount of time spent in these centers by the children when a microcomputer was added to the classroom environment. It was necessary to construct an instrument for recording observational data. The Interest Center Frequency Chart (Appendix B) was developed by the researcher. On the horizontal axis, each chart listed the children's names across the top. On the vertical axis, the interest centers for one observation station, 3 of the 12 interest centers, were listed.

There were four observation stations, therefore, four different Interest Center Frequency Charts were needed to provide for recording activity in all 12 interest centers. The four Interest Center Frequency Charts were duplicated to provide for the 7 weeks of observations. The charts for each observation station were then placed in a different colored report folder. These folders were placed in the adjoining teacher's workroom so that they would be easily accessible to the observers.

Observers who were competent, conscientious, and consistent were needed to collect the data. Undergraduate students from the advanced classes of the Family Relations and Child Development Department were offered the opportunity to volunteer to serve as recorders in the project. These students had received instruction for observing and recording behavior in previous courses, and all had experience in observing in the Child Development Laboratories. All volunteers selected as observers were female. The volunteer would record data for 30 minutes (9:30 - 10:00 a.m.) for 1 day per week for 7 weeks. As there were four observation stations (one for each of the three interest center groupings), 20 volunteers were needed.

Each volunteer was instructed on the use of the Interest Center Frequency Chart and participated in trial observations before actually gathering the data. Each child wore a nametag on his or her back. The children were accustomed to wearing nametags in the Child Development Laboratories. Each volunteer was assigned a certain observation station for the entire 7 weeks. Each time the observer participated, she was to obtain the colored folder for her assigned area and a 3-minute egg timer in order to record time sampling of the children's participation in each interest center for her observation station. Combining the records of

the four observation stations provided a detailed account of the participation in all of the interest centers available in the room. The observer noted which children were in the interest centers that she was observing. She then made a slash mark in the appropriate box on the Interest Center Frequency Chart for each child. After the observer had completed this task, the observer turned over the egg timer. When the egg timer was emptied, the observer again recorded which children were in the three interest centers, noting only those who were in the center at the beginning of each 3-minute period. Data collected would indicate how many 3-minute periods each child had spent in an activity area. Each child would be able to receive a maximum of 10 3-minute units for a 30 minute period.

To develop a baseline for later comparisons, observations of the classroom were made for one week prior to the introduction of the computers. This procedure allowed the researcher to identify which interest centers the children were using and the amount of time individual children remained in a given interest center.

When the computers were placed in the classroom, only one software program, "Delta Drawing," was introduced during the first week. This program was entered into both computers. "Delta Drawing" was selected as it met many of the criteria stated earlier. It allowed the child to explore the computer keyboard and reacted immediately to the child's command by "drawing" on the monitor screen. This immediate, positive feedback would give the child a sense of control and accomplishment. The researcher was seated next to the computers to help the children by answering questions, but the children were encouraged to explore and experiment on their own. Certain keys were marked by covering the

corner area of the key with a small, triangular piece of green tape to give the children some guidance in using the program. Each child was allowed up to 15 minutes to use the microcomputer. Each child indicated his or her name on a clipboard so as to give each child the opportunity to use the microcomputer.

Additional software programs were introduced approximately every 10 days. After the four software programs were introduced, the children were allowed to request any of the programs during the remainder of the semester. "Delta Drawing" was always available for the children's use along with the other programs. A printer was added after the first 4 weeks. The printer could only be used with the "Delta Drawing" program. The children could make a printout of their creation, but the printer would only print in black and white while the monitor showed the child's drawing in color.

Observations of the children and the interest centers were made by the observers at regular intervals throughout the remainder of the semester. These weeks were as follows: the week for collecting base-line data, the first 2 weeks with the computer in the classroom, 2 consecutive weeks after the computer had been in the classroom for 4 weeks, and 2 consecutive weeks after the computer had been in the classroom for 8 weeks.

The microcomputers and the accessories were removed from the classroom 2 weeks before the semester ended. A follow-up letter and questionnaire (Appendix A) were sent home with the parents asking for their reaction to the use of the microcomputers in their child's classroom.

Analysis of Data

The primary goal of this research study was to examine the children's selection of interest centers before and after the introduction of the microcomputers. The researcher used Pearson product-moment correlations to note any significant relationships between the children's selection of activity centers during the baseline week and their selection of activities after the microcomputers were introduced. The comparisons were made between the baseline week data and the data from the 2nd week, the 5th week, and the 9th week the microcomputers were in the classroom. The data reflected the number of intervals a child was in a particular interest center during a 30 minute period. The score for each child in a given interest center might range from 0 to 10. The maximum number of times a child could be recorded was 10, one mark for every 3-minute interval.

Comparisons were also made between each activity during the baseline week, 2nd week, the 5th week, and the 9th week. This would show which activities were initially affected by the addition of the microcomputer center, which were not, and which returned to baseline week activity levels and which did not during the length of the observations. A one-way repeated measures analysis of variance was used to measure this over time. In addition, the repeated measures analysis of variance was used to compare each activity across the selected weeks by sex of subject. This would indicate any significant use of the microcomputer according to gender. Graphs were constructed of each child to show individual differences over the weeks. After the repeated measures analysis of variance was applied to the data, Duncan's multiple range

test was used to examine where a significant difference may have occurred in the data.

Data collected from centers which had similar uses and/or objectives was grouped together to facilitate the calculating of the raw data. The small group room was not always open, but when it was, the room was used for dramatic play. Therefore, the data from the small group room and the housekeeping center were grouped together as dramatic play. The science center and the table manipulatives were combined together as the discovery activities for both encouraged exploration of various materials. The unit block center and the hollow block center were incorporated into the block activities. The library center and the listening center became the library/listening center. Finally, the climbing structure was renamed the gross motor activities.

CHAPTER IV

RESULTS OF THE STUDY

The major goal of the study was to analyze the effects of the installation of two microcomputers into a developmental preschool environment and particularly the effect on the interest center selection by the children. An additional goal was to examine gender preference in the use of the microcomputer.

Measurements

The measurement used in this study is quantitative as the unit counted consisted of the number of 3-minute periods a child spent in an activity center. In addition, when selecting statistical treatment for the data, interval level assumptions were accepted.

Subjects

The subjects were a sample (one group of 18) of prekindergarten children. They were not a random sample of a population; however, the sample was not biased through selection of certain individual subjects and may well be fairly representative of prekindergarten children who live in an academic community and who are primarily from intact, dual-earner families (Table I).

TABLE I

DESCRIPTION OF SUBJECTS

Age of Child	Girls	Boys
Median	4 yrs., 11 mos.	5 yrs., 3 mos.
Mean	5 yrs., 1 mo.	5 yrs., 3 mos.
Range	4 yrs., 9 mos. to 6 yrs., 1 mo.	4 yrs., 9 mos. to 5 yrs., 7 mos.

Number of People in Family:	Median	4
	Mean	3.89
	Range	2 to 5
Child's Position in Family:	Only	2
	Oldest	7
	Middle	0
	Youngest	9
Marital Status of Parents:	Married	16
	Separated	0
	Divorced	2

Age of Parent	Mother	Father
Median	33 yrs., 2 mos.	35 yrs., 2 mos.
Mean	33 yrs., 6 mos.	36 yrs., 5 mos.
Range	24 yrs., 11 mos. to 40 yrs., 6 mos.	25 yrs., 8 mos. to 56 yrs., 6 mos.

Highest Education Level	Mother	Father
High School Diploma	2	1
Technical Training	2	1
Undergraduate Degree	5	5
Graduate Degree	9	9
Occupation of Parents		
Self-employed	2	5
Student	6	3
Medical	3	1
Education	7	7

Type of Research

This study was primarily descriptive. However, some inferential statistical techniques were applied to the data in order to shed light on the research questions. Any inference derived could serve to guide further research, but should not be used to predict the behavior of children, either individually or in a group.

Research Hypothesis #1. The usage of various classroom interest centers by a group of prekindergarten children will not change when a microcomputer center: (a) is introduced, (b) has been available for 4 weeks, and (c) has been available for 8 weeks. Significant differences were found in three of the eight centers. A one-way analysis of variance was performed on the data of each of the centers comparing the mean usage across time. In addition, Duncan's multiple range test was performed to identify more specifically the source of any difference. Statistically significant differences, $F(3, 56) = 3.67$, $p < .02$, were found in the use of the discovery center. Duncan's multiple range test showed both the baseline observations and those from Week 5 differed significantly from those for Week 9. The use of the art center was also found to differ significantly, $F(3, 56) = 4.64$, $p < .01$. When Duncan's multiple range test was performed, the usage of the art center in Weeks 2 and 5 showed a significant difference from baseline. The use of the water/sand table also differed significantly over time, $F(3, 56) = 2.73$, $p < .05$. Data showed significant differences in the usage of the water/sand table between Week 5 and Week 9. A summary of the analysis of the usage of centers across time can be seen in Table II.

TABLE II

ANALYSIS OF VARIANCE COMPARING USAGE OF EACH INTEREST CENTER ACROSS TIME[1]

Center	F-value	r^2	p
Blocks	1.08	.05	.37
Library	1.94	.09	.13
Dramatic Play	0.20	.01	.90
Discovery	3.67	.16	.02
Art	4.64	.20	.01
Water/Sand Table	2.73	.13	.05
Gross Motor	0.10	.01	.96

[1]Time variable consisted of observations in four time periods; 1) Baseline, before introduction of a computer center, 2) Week 2, after computer center had been available one week, 3) Week 5, after computer center had been available for four weeks, and 4) Week 9, after computer center had been available for eight weeks.

Research Hypothesis #2. The variables of sex of a child and observational time period (Baseline, Week 2, Week 5, and Week 9) will not be related to usage of interest centers separately or as an interaction. When examining results of observations, sex of child was not related to use of the computer center, the library/listening center, and the discovery center. Sex of child was found to be significantly related to usage of blocks (more boys, $p < .0001$), dramatic play (more girls, $p < .0001$), art (more girls, $p < .01$), gross motor (more boys, $p < .01$), and water/sand (more boys, $p < .05$). These results are presented in Table III. A graphic presentation of use of centers by boys and girls

TABLE III

ANALYSIS OF VARIANCE COMPARING USAGE OF EACH INTEREST CENTER BY GENDER ACROSS WEEKS 2, 5, AND 9[1]

Center	Source	df	SS	F-value	p
Computer	Sex	1	267	1.16	.30
	Time	2	721	3.27	.05
	Time x Sex	2	108	0.49	.62
Blocks	Sex	1	8600	43.82	.00
	Time	3	1442	3.04	.04
	Time x Sex	3	901	1.90	.14
Library	Sex	1	127	3.14	.10
	Time	3	219	2.16	.11
	Time x Sex	3	126	1.24	.31
Dramatic Play	Sex	1	4296	31.65	.00
	Time	3	376	1.26	.30
	Time x Sex	3	818	2.74	.05
Discovery	Sex	1	94	1.06	.32
	Time	3	1388	4.11	.01
	Time x Sex	3	93	0.28	.84
Art	Sex	1	618	7.64	.01
	Time	3	1462	5.89	.00
	Time x Sex	3	611	2.46	.07
Water/Sand Table	Sex	1	160	6.17	.02
	Time	3	361	4.41	.01
	Time x Sex	3	137	1.67	.19
Gross Motor	Sex	1	912	7.50	.02
	Time	3	18	0.13	.94
	Time x Sex	3	486	3.58	.02

[1]Time variable consisted of observations in three time periods; 1) Week 2, after computer center had been available one week, 2) Week 5, after computer center had been available for four weeks, and 3) Week 9, after computer center had been available for eight weeks.

may be found in Figure 1. The percentage for each activity was found by dividing the total number of 3-minute units for that activity by the total number of 3-minute units for the entire classroom. Each child could receive 10 3-minute units. There were 13 children; therefore, creating 180 3-minute units for each day. Figure 1 shows an overall mean use of the variance interest centers during the 11-week observation period.

When examining results of observations, time (Baseline, 2nd, 5th, and 9th weeks after introduction of a computer center) was not related to use of the library, dramatic play, or gross motor centers. However, time was found to be significantly related to the computer center (use declined after 8 weeks, $p < .05$), block area (use dropped in Week 5 and then rose again, $p < .05$), discovery center (use decreased unevenly, $p < .01$), art area (waned in Weeks 2 and 5, but climbed in Week 9, $p < .002$), and water/sand table (fell from Baseline in Weeks 2 and 9, $p < .01$). See Table III.

When examining results of observations, gender across time interaction was found to be statistically significant in the gross motor center ($p < .02$) and dramatic play center ($p < .05$). Gender use over time was not related to use of the computer center, block area, library/listening center, discovery center, art center, and water/sand table (see Table III). A graphic presentation of these interactions may be found in Figure 2.

Research Question #4. There will be no significant difference between the usage of a computer center and the usage of other interest centers available in Weeks 2, 5, and 9 of the program providing a

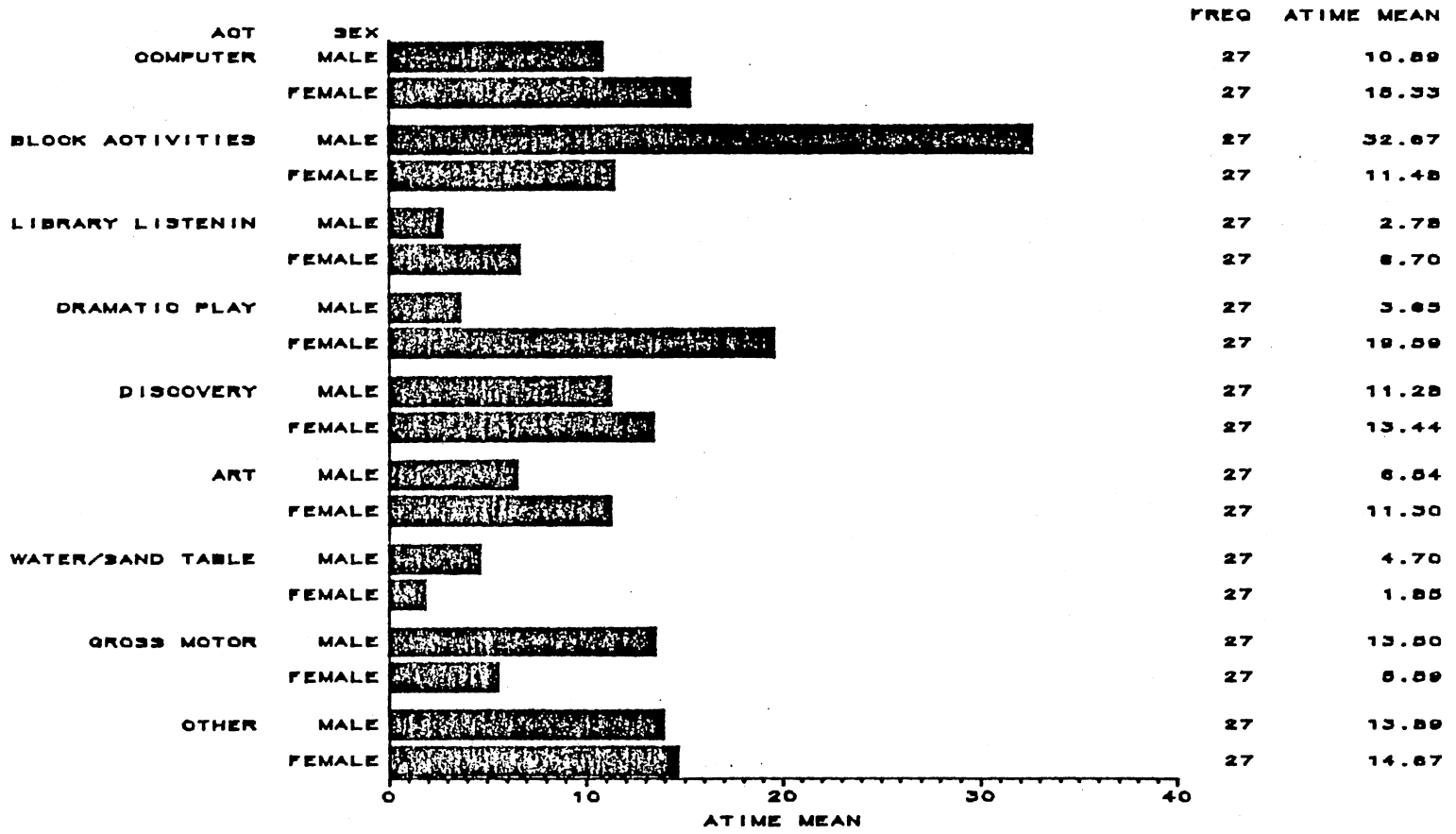


Figure 1. Percentage of Overall Use of Centers by Males and Females

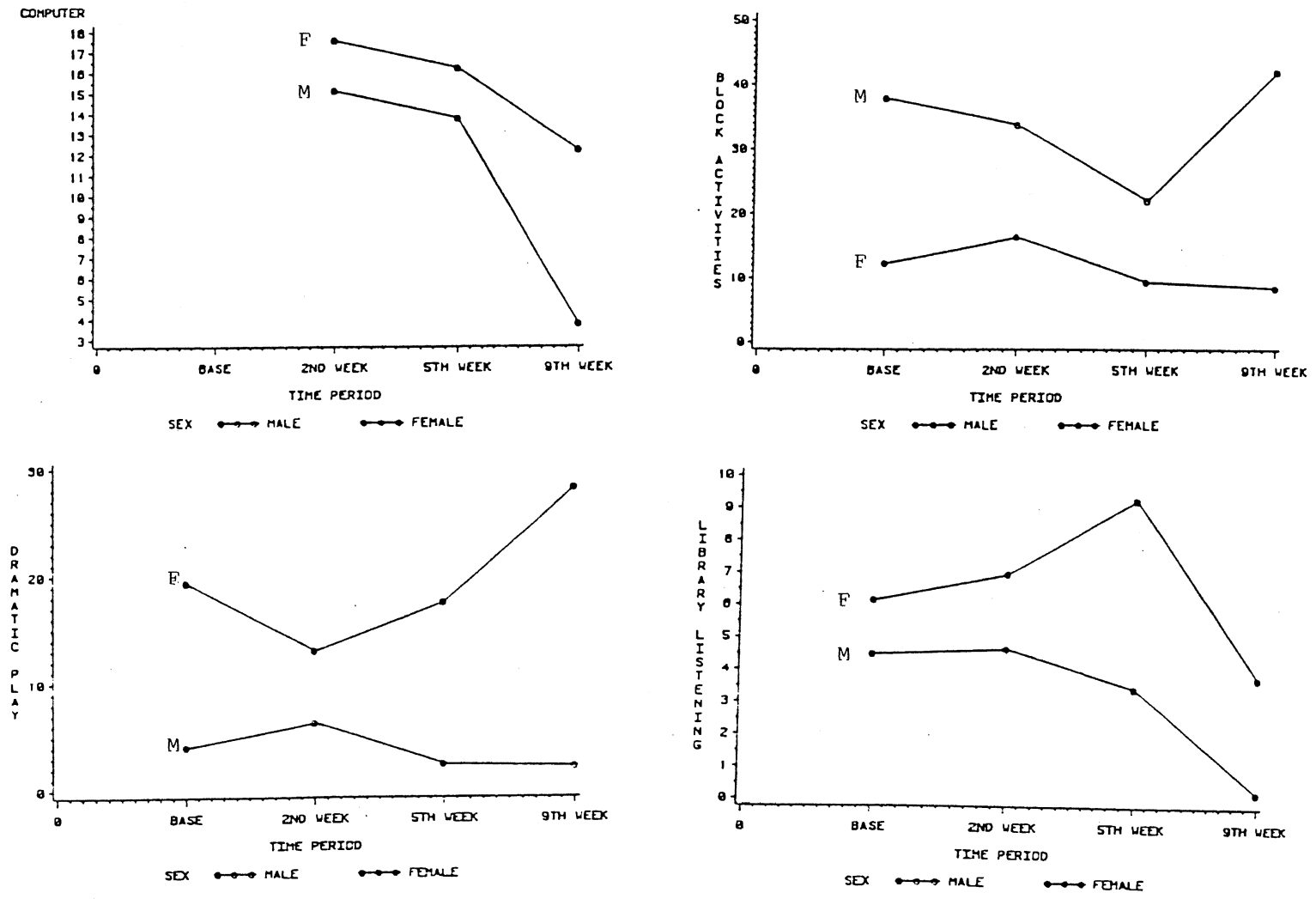
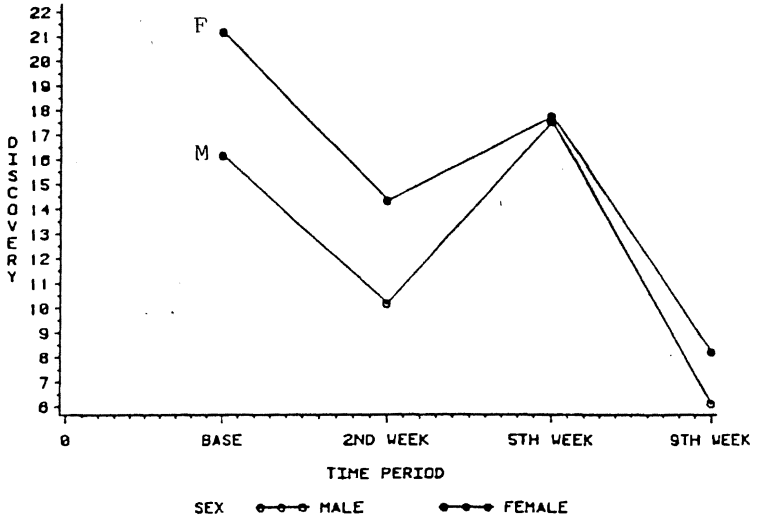
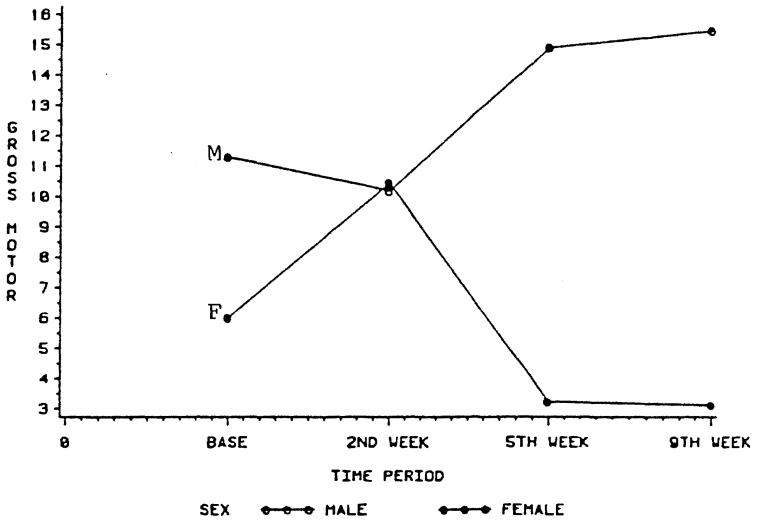
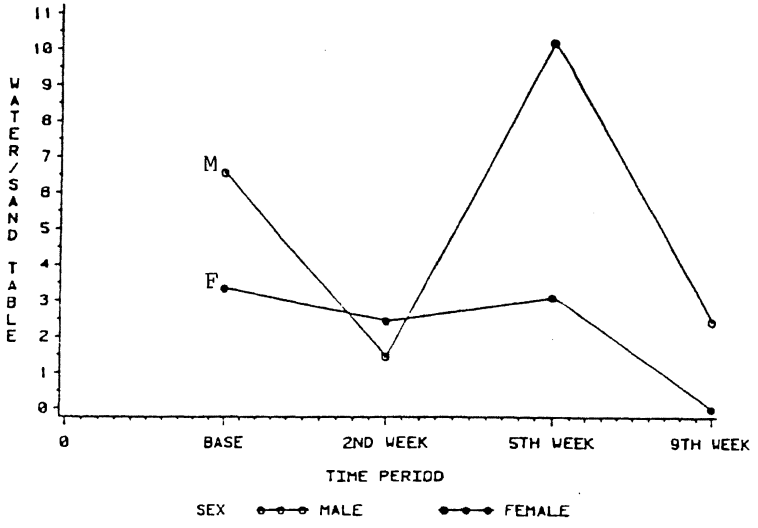


Figure 2. Usage of Individual Interest Centers Across Time by Male and Female







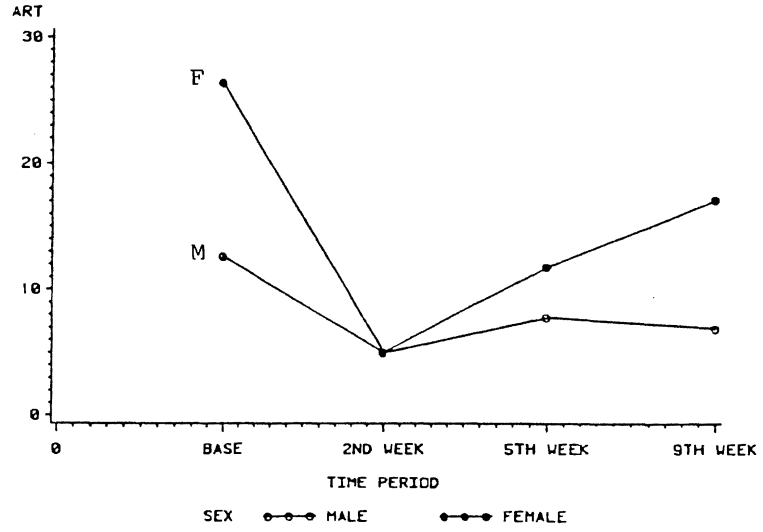


Figure 2. (Continued)

computer center in a prekindergarten classroom. During baseline observations, the block, discovery, and art centers showed high usage with 27.7%, 18.2%, and 18.1%, respectively, of child participation in these centers based on the 3-minute periods per center with a maximum of 10 possible 3-minute periods. When the computer center was added in Week 2, the block area (25.1%) continued as the activity selected most frequently by individuals. The computer center (16.3%) was also chosen by the subjects frequently. The discovery center (12.3%) showed some decline in usage, but continued to be high in number of times selected by individuals. During Week 5, the discovery center was chosen by the children most often (17.7%) while the block area (15.8%) and the computer (15%) declined somewhat in their usage. By Week 9, the block area had again become the most frequent choice of the children (25.3%). Both the dramatic play center (15.2%) and the art center (12%) showed increases in their usage while the computer continued to decline (8%). See Table IV.

The "Other" category denotes the period of time when an individual child was not in a specific center. The child may have been at his or her locker, in the bathroom, or deciding which activity to choose next.

In addition to examining the analysis of variance across time, the mean percentage for computer usage in each time period was compared by a t test to the means of percentage of usage for each of the other centers in each time period. A summary of the relation of computer usage to usage of other interest centers is presented in Table V. From this information, it can be concluded that among seven interest centers observed for 30 minutes each day during seven different five-day periods (21 comparisons - Week 2, Week 5, and Week 9 being reported), the usage

TABLE IV

ANALYSIS OF VARIANCE COMPARING EACH ACTIVITY ACROSS TIME

Center	Baseline M*	Week 2 M	Week 5 M	Week 9 M	Mean M
Computer	---	16.33	15.00	8.00	13.11
Block	27.70	25.11	15.77	25.33	23.48
Library	3.66	5.83	6.39	2.00	4.47
Dramatic Play	10.17	9.64	10.00	15.22	11.26
Discovery	18.17	12.25	17.67	7.17	13.82
Art	18.13	4.97	9.78	12.00	11.22
Water/Sand Table	5.27	1.94	6.67	1.22	3.78
Gross Motor	9.17	10.31	9.06	9.28	9.46
Other	6.53	13.44	9.61	19.78	12.34

*Note. The average number of 3-minute units the center was used by the total number of children during that particular week.

TABLE V

t TEST PROCEDURE COMPARING COMPUTER TO INDIVIDUAL ACTIVITIES BY WEEK

Center	Week 2		Week 5		Week 9	
	M*	p	M	p	M	p
Computer	14.93	--	14.80	--	9.20	--
Block	24.93	.29	14.47	.85	27.73	.00
Library	6.47	.00	4.87	.02	1.43	.00
Dramatic Play	9.03	.03	9.73	.97	12.40	.07
Discovery	12.97	.62	17.87	.20	7.00	.30
Art	5.30	.01	8.80	.02	11.53	.46
Water/Sand Table	2.33	.00	6.67	.05	1.47	.00
Gross Motor	10.97	.07	10.33	.41	9.93	.83

*Note. During the baseline week, two students were absent. Therefore, the percentages between Table IV and Table V will be different.

of the computer center was significantly less in only one of the comparisons (blocks for Week 9); and the computer center was used significantly more than other centers in 9 of the 21 comparisons (library, Weeks 2, 5, and 9; art, Weeks 2 and 5; water/sand, Weeks 2, 5, and 9; dramatic play, Week 2). In 11 of the comparisons there was no significant difference between use of the computer center and use of other centers.

CHAPTER V

CONCLUSIONS AND DISCUSSION

The first major hypothesis stated that the usage of various classroom interest centers by a group of prekindergarten children would not change when a microcomputer was introduced, had been available for 4 weeks, or had been available for 8 weeks. This hypothesis was tested in an effort to support or refute the ideas which have been presented in that 1) children will discontinue use of the usual centers if a computer is available, 2) use of a computer will decline after an initial acquaintance period, and 3) focus of activities in interest centers will be altered if a computer center is available.

The researcher cannot conclude that the introduction of a computer center made a major change in the pattern of usage of other centers available to the group. It may be noted, however, that significant differences in usage were observed in the discovery center across the time periods. In Week 9 usage dropped ($p < .02$). This drop in usage may have been due to the children becoming less interested in the materials made available even though the materials were changed frequently. The children could have been losing interest due to the time of year and the familiarity of the materials. Significant differences ($p < .01$) were also noted in usage of the art center. Use fell from 18% in the Baseline week to 5% after the first week of having a computer available. In the two succeeding periods use increased to 10% and 12%, respectively.

The usage of the water/sand table also varied significantly ($p < .05$) across the time periods from 5% during the Baseline to 2% in Week 2. Usage during Week 5 (7%) surpassed the Baseline, but fell again during Week 9 to 1%.

In the current study, no evidence was found to support the predictions sometimes found in the literature that a computer center would cause major, continuing changes in young children's use of traditional curriculum materials. Changes that do occur are transitory changes. More specifically, the data in the current study did not support results reported in some previous studies that the use of art materials was supplanted by the use of a computer. The previous study was conducted over a 4 week observation period during which time use of the art center did decline. The current study was conducted over an 11 week period showing a marked decline in the use of the art center with the introduction of the microcomputer interest center. However, the art center showed a steady rise in use the longer the computer remained in the classroom environment. The art center did appear to experience the greatest change across time, but it may be recognized that the observed variation in usage may reflect the interest of the children in the art center and may or may not be related to the availability of a computer center. Further research is indicated.

For those planning and evaluating early childhood curriculum, it should be of particular interest to note that the traditional mainstays of a developmental program (blocks, dramatic play, and gross motor) showed very little variation across time ($p = .37$, $.90$, and $.96$ respectively with significance being measured at $p < .05$). These findings support a conclusion that when children are given choices of

developmentally appropriate materials, they will continue to engage in traditional early childhood activities such as blocks, dramatic play, and gross motor, and will regain level of usage of art materials which might have been channeled to use of the computer initially.

The second major research hypothesis stated that the variables of the sex of a child and the observational time period (Baseline, Week 2, Week 5, and Week 9) would not be related to usage of interest centers separately or as an interaction due to the sex of the child, the observational time period, or the interaction of sex across time. Among the children in the current study, it can be concluded that in the centers primarily related to cognitive activities (computer, library/listening, and discovery) there were no differences in usage according to the sex of the child. These observations raise the question of the possibility that the poorer performance by girls in mathematics and science which has been reported for older children is something that develops over time as children interact with the school environment and with cultural influences of the American society. The results of the current study do not support a long-held notion that, even in the early years, girls are more interested in books and listening than are boys.

The results of this study suggest the desirability of providing opportunities for interesting, successful, and satisfying early experience for both boys and girls if changing previously reported gender differences in cognitive activities is a curriculum goal.

Other results of the analysis of usage of various interest centers according to the sex of the child should be of considerable interest to early childhood teachers and curriculum specialists. Most developmental preschools and many families, such as those whose children participated

in this study (well-educated, dual-earner families), have for many years espoused and promoted the concept of androgynous behavior being desirable. Boys are provided with dolls, encouraged to play in the housekeeping area, and encouraged to express their feelings openly; and girls are encouraged to be active in block building, climbing, and other gross motor activities at school. At home, mothers go to work outside the home and fathers often cook, clean, and do laundry. In spite of this background of androgyny, it must be noted that there were very significant gender differences in the usage of certain centers during this study. The differences observed were: 1) more boys used the blocks ($p < .0001$), 2) more girls used the dramatic play (housekeeping) area ($p < .0001$), 3) more girls used the art center ($p < .02$), and 4) more boys used the gross motor center ($p < .02$) and the water/sand table ($p < .05$). These differences are consistent with the stereotypic expectations for sex role behavior which have been traditional in American society for several generations. One must ask why such stereotypic patterns of behavior were observed in a situation where both home and school would seem to be encouraging androgynous behavior rather than stereotypic sex role behaviors. Further investigation is indicated.

The third major research hypothesis for this study stated that there would be no significant difference between the usage of a computer center and the usage of various other interest centers available in Weeks 2, 5, and 9 in a prekindergarten classroom. It has been felt that when a new, attractive activity is introduced into a classroom, the new activity will draw much interest. In addition, the new activity will take away from other activities in the classroom. However, as the children become accustomed to the new activity, the high interest will

decrease over time and the other activities will return to their original level of interest and usage by the children.

An examination of the result indicates that before the computer center was introduced the block area, the discovery area, and the art center were the most used centers in the classroom. The library/listening and water/sand table were the least used.

When the computer center was introduced, the children did show a great interest in the computer center. The areas which showed the greatest change and decline in their usage were the art area, the water/sand area, and the discovery center. Also, the children showed a tendency to be "wandering," not choosing any particular area to work in as shown by the "Other" category in Table IV.

As the computer center became integrated into the classroom environment, the interest in the center waned. When the computer was introduced, 16% of the children's possible participation units were used at the computer, but by Week 9 only 8% of the children's time was used at the computer. By the end of Week 9, many of the centers were returning toward their Baseline usage. The centers showing a distinct downward trend in Week 9 compared to their Baseline usage were the water/sand table and the discovery center. Such results should in no way be construed to suggest that the discovery and water/sand centers should be eliminated from a program, nor should the results be construed to suggest that computers and blocks are supplanting other aspects of the program. For the children in the study, one may conclude that the computer center was of interest and was well-used but did not supplant other aspects of a developmental curriculum.

Further study of more young children and study over longer periods of time are indicated in order to learn more about young children's use of a computer center in a classroom.

Since there are wide variations in the behavior of individual children, some readers may be interested in the behavior observed for each child in the group under study. No inferential treatment was applied to records of the behavior of individual children. A description of the activities of each subject may be found in the line graphs presented in Appendix C. It is hoped that these graphs may shed some light on patterns of usage of the computer and other interest centers, but no effort has been made in this study to relate individual behavior to other factors.

Further research might examine individual usage of the computer and other interest centers in relation to a variety of factors, including prior experience with computers, parent attitudes toward computers, teacher's judgments of child's current focus of interest (cognitive, affective, motor, social, or emotional).

In conclusion, the addition of a microcomputer to one preschool classroom over a period of time did not affect the usage of the other various activity centers in this developmental preschool classroom. The microcomputer center became another activity that was used and enjoyed by both boys and girls. There was no significant gender difference with the usage of the microcomputer.

As the 20th century ends and the preschool classroom enters the 21st century, the computer center will become another interest center for children to discover, explore, and manipulate as have the other traditional centers. The microcomputer center was not designed to

replace any activity, but rather (depending on the software program provided) to enhance the creativity and discovery opportunities for the child.

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APPENDIXES

APPENDIX A

PARENTAL LETTERS AND QUESTIONNARIES

February 11, 1985

Dear Parents,

Starting the week of February 18th, your child will have the opportunity to work on an IBM PC Jr. microcomputer. Your child will be introduced to basic terminology and instructed in how to use the computer. The software programs will provide some basic concepts and will allow for creativity.

I will be doing research to identify what affect the addition of a computer interest center to the preschool setting will have on the children and on the curriculum as a whole. I would appreciate any comments or reactions you may hear from your child during the semester. Also if you have any concerns, please feel free to ask.

In addition, you will find attached to this letter, a background information questionnaire. Would you please fill out the questionnaire and return it to me by this Friday, February 15? If I am not available at the time you bring your child, please place your questionnaire in the green folder marked "Parent Questionnaire" next to the attendance notebook.

Thank you for your cooperation.

Sincerely,

Kathy

Kathleen L. Rutledge
Graduate Assistant, A.M.

COMPUTER BACKGROUND QUESTIONNAIRE

Child's Name _____

Child's Birthdate: Month_____ Day____ Year_____

Number of children in the family: _____

This child's position in the family (first, second, etc.)

_____

Mother:

Birthdate: Month_____ Day____ Year_____

Occupation: _____

Education (check highest level):

_____High School

_____College, number of years attended _____

Degree(s) earned:_____

Father:

Birthdate: Month_____ Day____ Year_____

Occupation: _____

Education (check highest level):

_____High School

_____College, number of years attended_____

Degree(s) earned:_____

****

1. Does your child have access to a microcomputer?

_____ yes

_____ no, skip to question #6

2. If so, does your child use the microcomputer?

_____yes, independently

_____yes, with minimal adult supervision

_____ yes, only with adult supervision

3. How often does your child use the microcomputer?

_____ 0-2 hours/week

_____ 3-5 hours/week

_____ more than 5 hours/week

_____ does not use the microcomputer

4. What brand and model of microcomputer does your child have acess to use?

Brand _____

Model _____

5. Is your child present when older family members or relatives use the computer?

_____ yes

_____ no

6. Does your child have access to a typewriter?

_____ yes

_____ no

7. Does your child use a typewriter at any time either with supervision or independently?

_____ yes

_____ no

8. Does your child have access to and use any electronic learning machines? (i.e. "Touch & Tell", "Talk 'n Play Cassette Player", etc.)

_____ yes, model _____

_____ no

9. How do you feel about your child using a microcomputer at school?

_____has my permission to participate in the microcomputer research project being conducted by Kathleen L. Rutledge.

_____
(Parent or Guardian)

_____
(Date)

April 30, 1985

Dear Parents,

As the semester draws to a close, so does the research with the computers. The children have spent many hours using the computers. The computer center was treated like other interest centers in the classroom. Children were encouraged to use the computers, but were also allowed to decline when they were busy in another center. The raw data has just been collected and I have not begun to analyze any of the data. But from general observations, interest was high in the beginning when I introduced the computers and has now waned over the months. Children have returned to traditional interest centers. This supports one of the hypotheses presented in my research proposal. Interest does return depending on the program available on the computers.

You will find attached to this letter, a summary questionnaire. Would you please fill out the questionnaire and return it to me by Friday, May 3rd? If I am not available at the time you bring your child, please place your questionnaire in the green folder marked "Parent Questionnaire" next to the attendance notebook.

I have truly enjoyed your children this year. I hope it has been as rewarding for them as it has been for me. I cannot begin to express how I have aappreciated your help, support, and input with my research.

Thank you so much.

Sincerely,

Kathy

Kathleen L. Rutledge
Graduate Assistant, A.M.

SUMMARY QUESTIONNAIRE FOR COMPUTER RESEARCH

Person answering questionnaire:_____

When your child returns from school,

1. ...he/she talks about using the school's computer.
   ____a. always
   ____b. often
   ____c. occassionally
   ____d. rarely
   ____e. never

2. ...he/she talks about wanting to use the school's computer.
   ____a. always
   ____b. often
   ____c. occassionally
   ____d. rarely
   ____e. never

3. ...he/she talks about other children using the school's computer.
   ____a. always
   ____b. often
   ____c. occassionally
   ____d. rarely
   ____e. never

4. ... he/she tells you when a new program was introduced (3 were introduced after "Delta Drawing")
   ____a. always
   ____b. often
   ____c. occassionally
   ____d. rarely
   ____e. never

5. ...he/she expresses a desire to use the new program.
   ____a. always
   ____b. often
   ____c. occassionally
   ____d. rarely
   ____e. never

6. Which of these programs have you heard your child mention?

____"Delta Drawing" (a drawing program used with the printer)

____"Alphabet Zoo" (dealt with the ABC's)

____"Juggles Rainbow" (ending with a rainbow, butterfly, or windmill)

____"J.J.'s Program 'Early Games'" (many different matching activities and drawing)

____ none of them.

Comments:

7. Has your child's interest in using your home computer increased during this spring semester?

____yes

____no

____doesn't apply

8. Has your interest for your preschool child's use of a computer increased or decreased?

____increased

____decreased

____become more guarded

Explain:

9. Any additional comments (positive or negative, interesting anecdote, observations, etc.)

APPENDIX B

INTEREST CENTER FREQUENCY CHARTS

INTEREST CENTER FREQUENCY CHART

OBSERVER # 1 _____ TIME _____ - _____ DATE _____

INSTRUCTIONS: Use the 3-minute egg timer (provided). Start the timer. Observe your area. If a child is in one of your observation areas, place a slash mark (///) under that child's name indicating in what area he or she is playing. Use this symbol for 5 times (~~////~~). When the egg timer has emptied, turn it over and repeat this procedure. Continue for 30 minutes. (9:30-10:00) Please DO NOT whisper or talk. It can be heard in the room and becomes very disrupting. Return folder and egg timer to research box. Thank you for your help!

nterest Center	Aaron	Ben	Dash	Eric	J.J.	Justyn	Patrick	Wes	Zack	Ana	Cecilia	Bridgett	Desirae	Emily	Julie	Kristin	Leslie	Sasha	Susan	Totals
Climbing Structure Center																				
Housekeeping Center																				
Water Table																				

INTEREST CENTER FREQUENCY CHART

OBSERVER # 2 _____ TIME _____ - _____ DATE _____

INSTRUCTIONS: Use the 3-minute egg timer (provided). Start the timer. Observe your area. If a child is in one of your observation areas, place a slash mark (///) under that child's name indicating in what area he or she is playing. Use this symbol for 5 times (~~////~~). When the egg timer has emptied, turn it over and repeat this procedure. Continue for 30 minutes. (9:30-10:00) Please DO NOT whisper or talk. It can be heard in the room and becomes very disrupting. Return folder and egg timer to research box. Thank you for your help!

erest Center	Aaron	Ben	Dash	Eric	J.J.	Justyn	Patrick	Wes	Zack	Ana Cecilia	Bridgett	Desirae	Emily	Julie	Kristin	Leslie	Sasha	Susan	Totals
Library Center																			
Listening Center (record player)																			
Table anipulatives																			

INTEREST CENTER FREQUENCY CHART

OBSERVER #3 _____ TIME_____-_____ DATE_____

INSTRUCTIONS: Use the 3-minute egg timer (provided). Start the timer. Observe your area. If a child is in one of your observation areas, place a slash mark (///) under that child's name indicating in what area he or she is playing. Use this symbol for 5 times (~~////~~). When the egg timer has emptied, turn it over and repeat this procedure. Continue for 30 minutes. (9:30-10:00) Please DO NOT whisper or talk. It can be heard in the room and becomes very disrupting. Return folder and egg timer to research box. Thank you for your help!

nterest Center	Aaron	Ben	Dash	Eric	J.J.	Justyn	Patrick	Wes	Zack	Ana	Cecilia	Bridgett	Desirae	Emily	Julie	Kristin	Leslie	Sasha	Susan	Tota
Computer Center																				
Art Center																				
Small Group Room																				

INTEREST CENTER FREQUENCY CHART

OBSERVER #4 _____ TIME_____-_____ DATE_____

INSTRUCTIONS: Use the 3-minute egg timer (provided). Start the timer. Observe your area. If a child is in one of your observation areas, place a slash mark (///) under that child's name indicating in what area he or she is playing. Use this symbol for 5 times (~~////~~). When the egg timer has emptied, turn it over and repeat this procedure. Continue for 30 minutes. (9:30-10:00) Please DO NOT whisper or talk. It can be heard in the room and becomes very disrupting. Return folder and egg timer to research box. Thank you for your help!

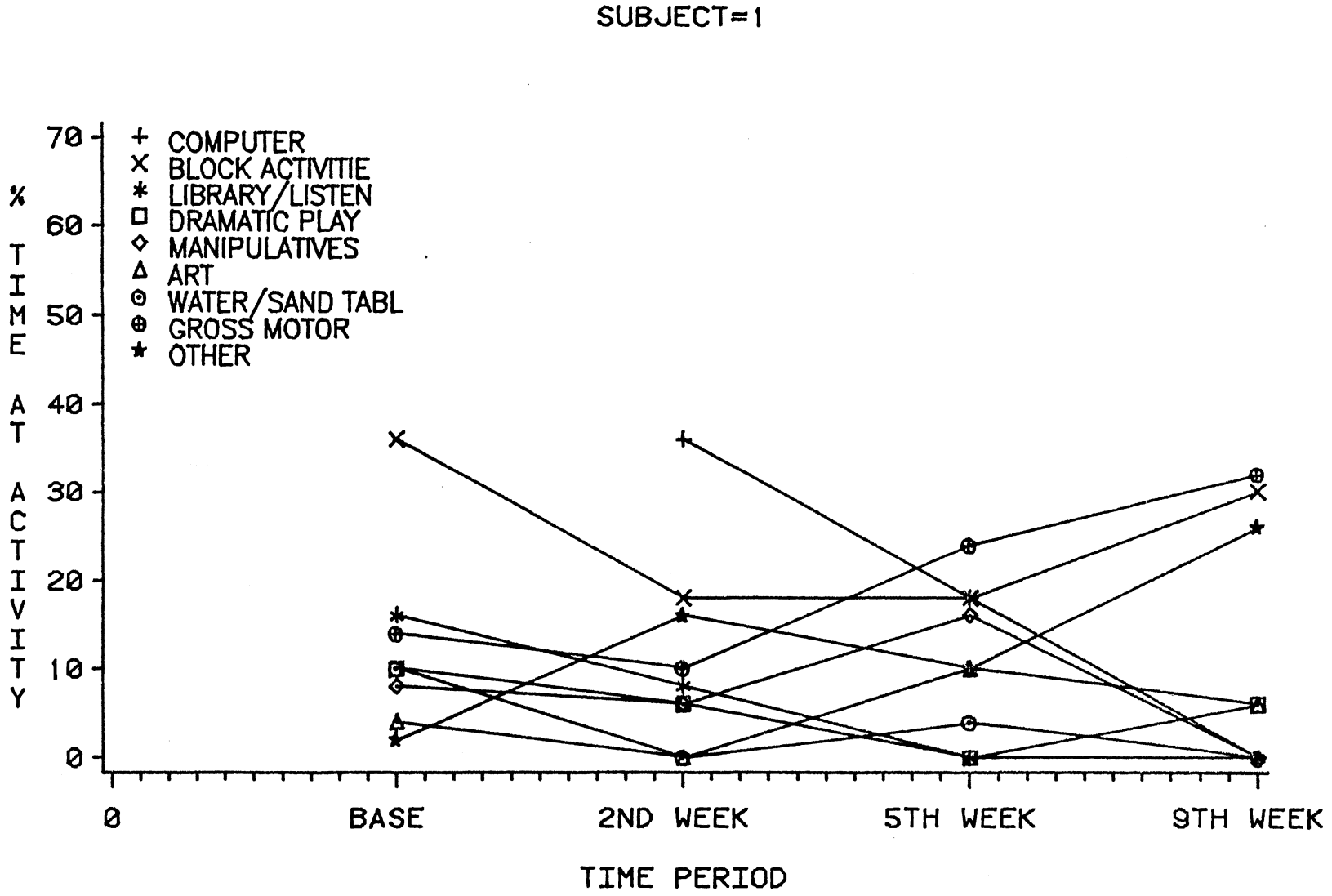
terest Center	Aaron	Ben	Dash	Eric	J.J.	Justyn	Patrick	Wes	Zack	Ana	Cecilia	Bridgett	Desirae	Emily	Julie	Kristin	Leslie	Sasha	Susan	Total
Hollow Block Center																				
Unit Blocks Center																				
Science Center																				

APPENDIX C

LINE GRAPHS OF PERCENTAGE OF TIME INDIVIDUAL SUBJECTS PARTICIPATED IN INTEREST CENTERS

NOTE: SUBJECTS #1 - 9, MALE;

SUBJECTS #10 - 18, FEMALE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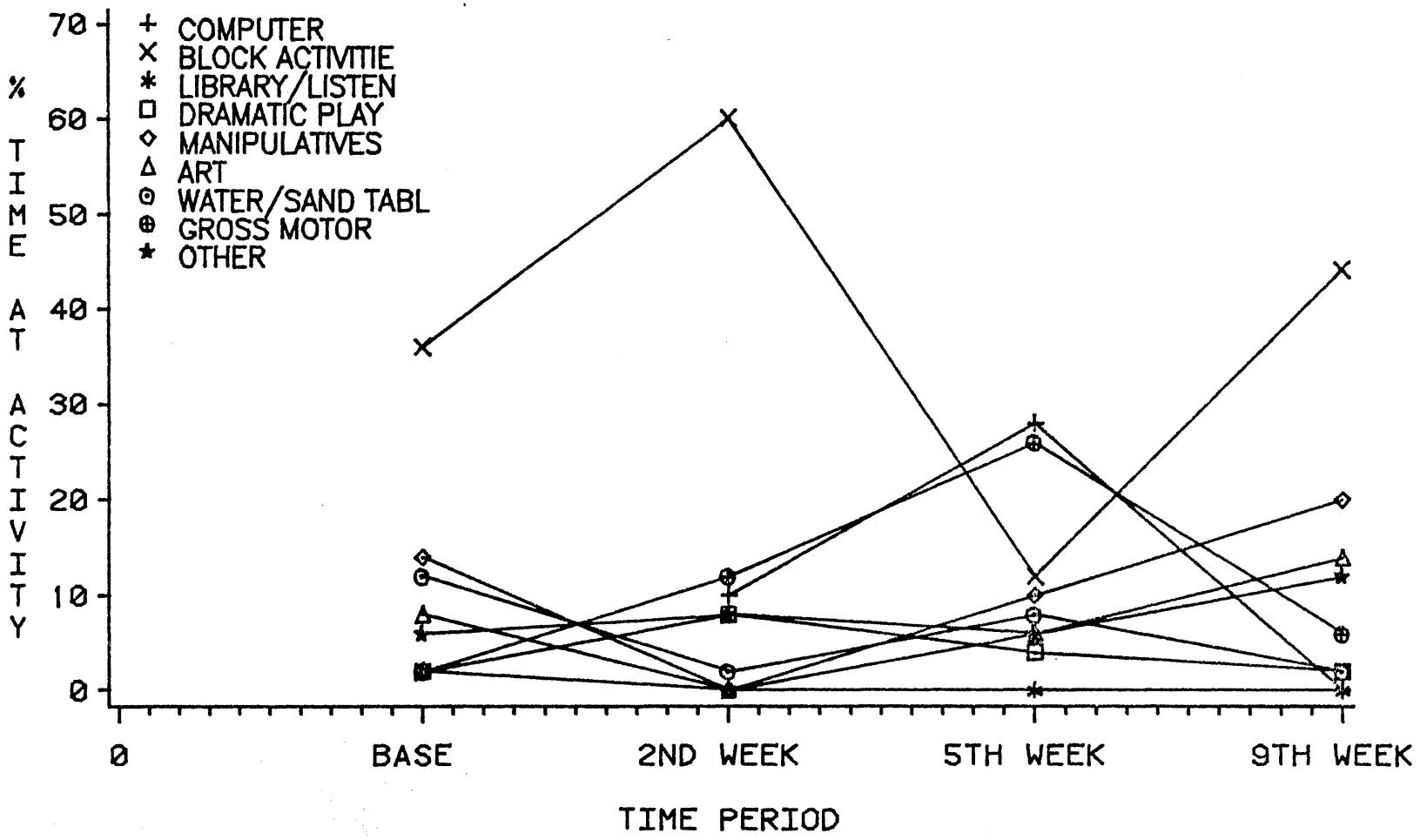
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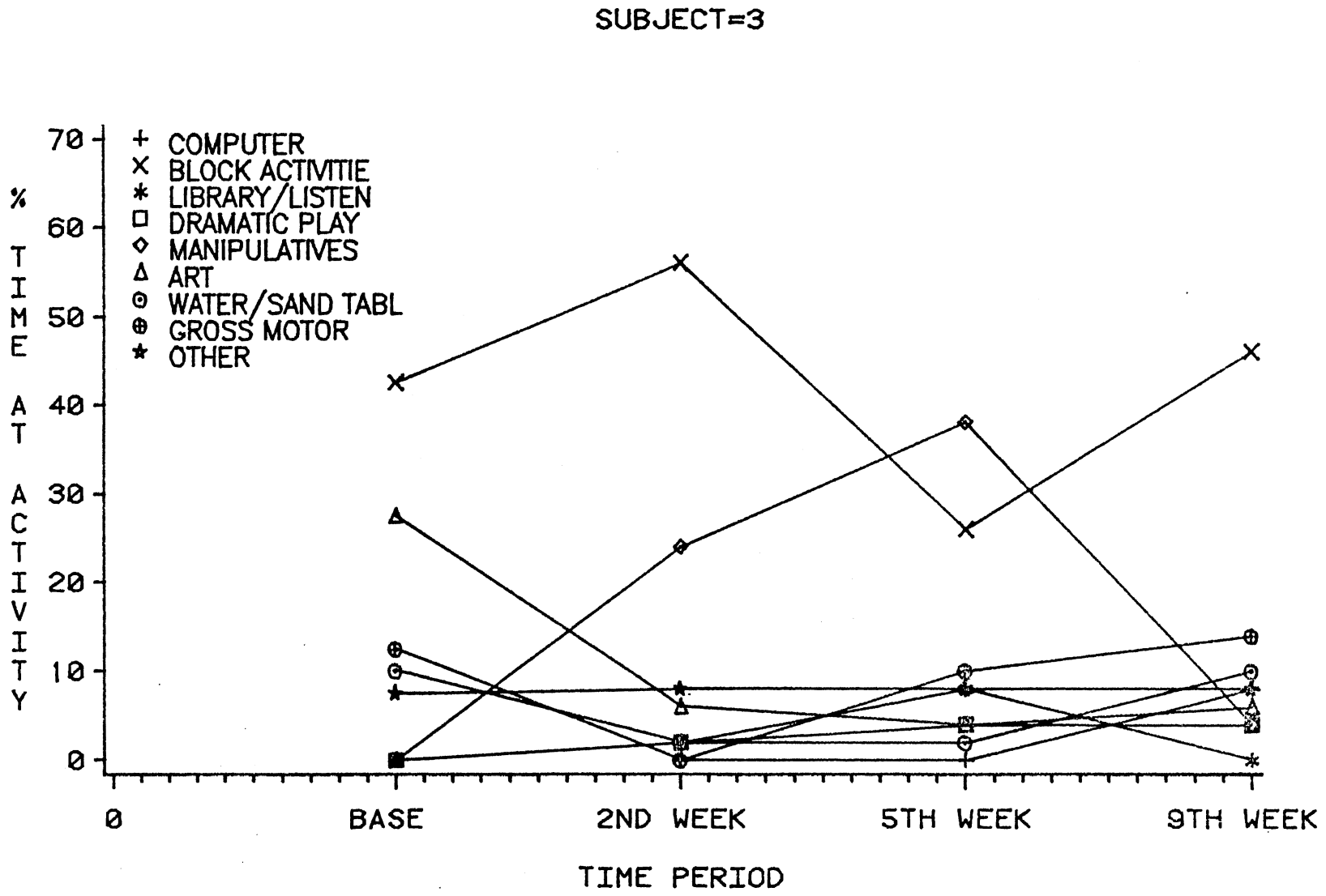
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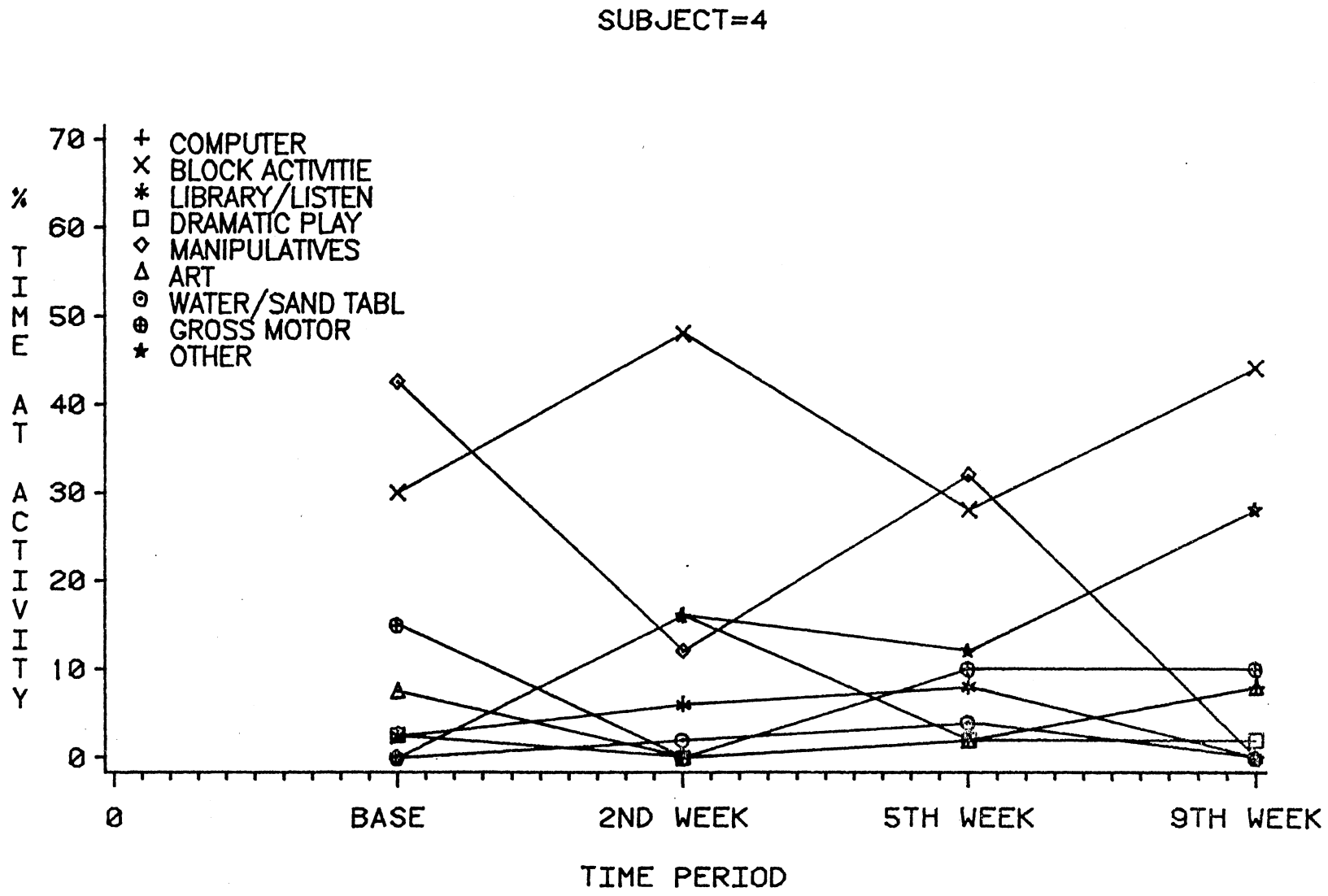
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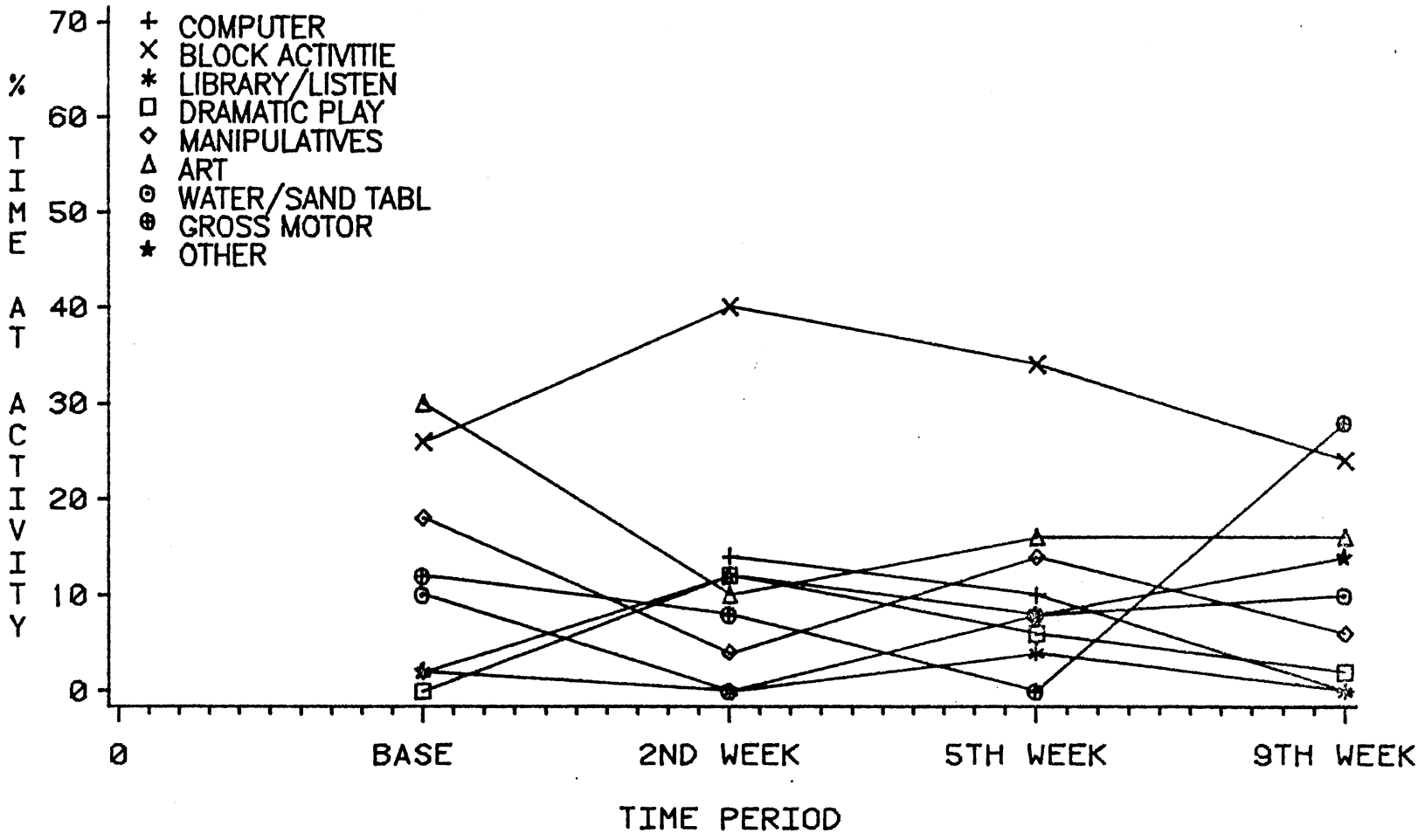
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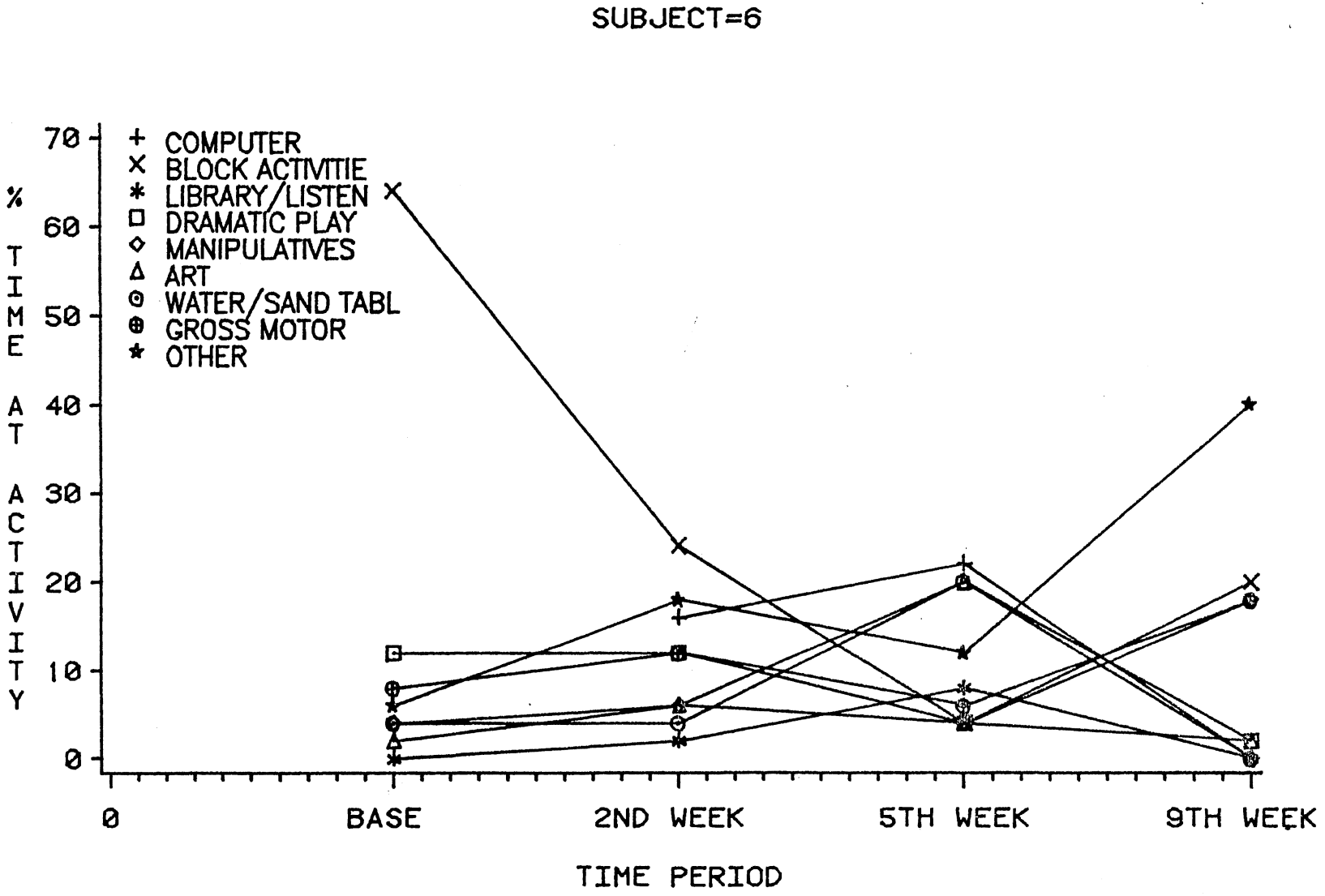
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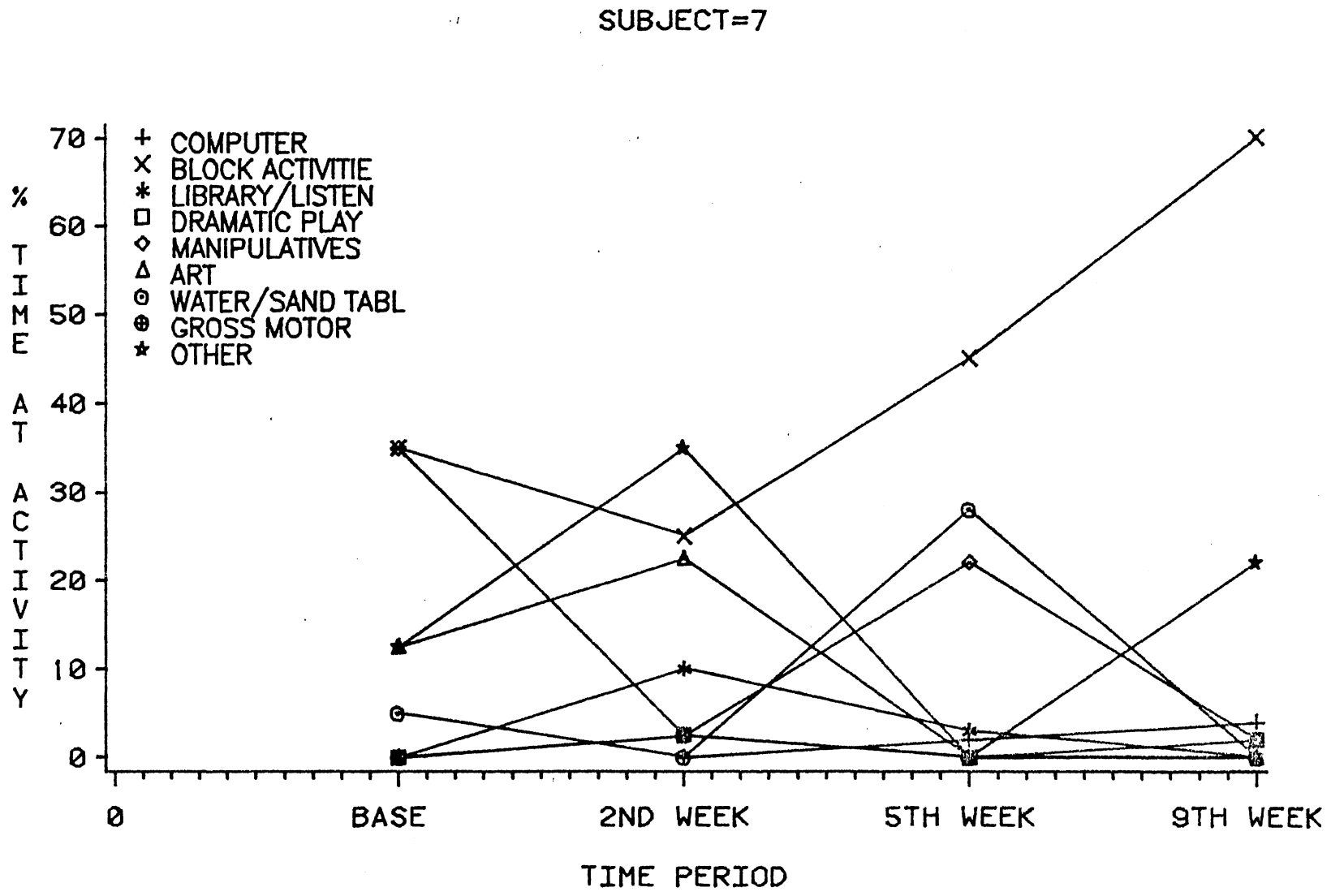
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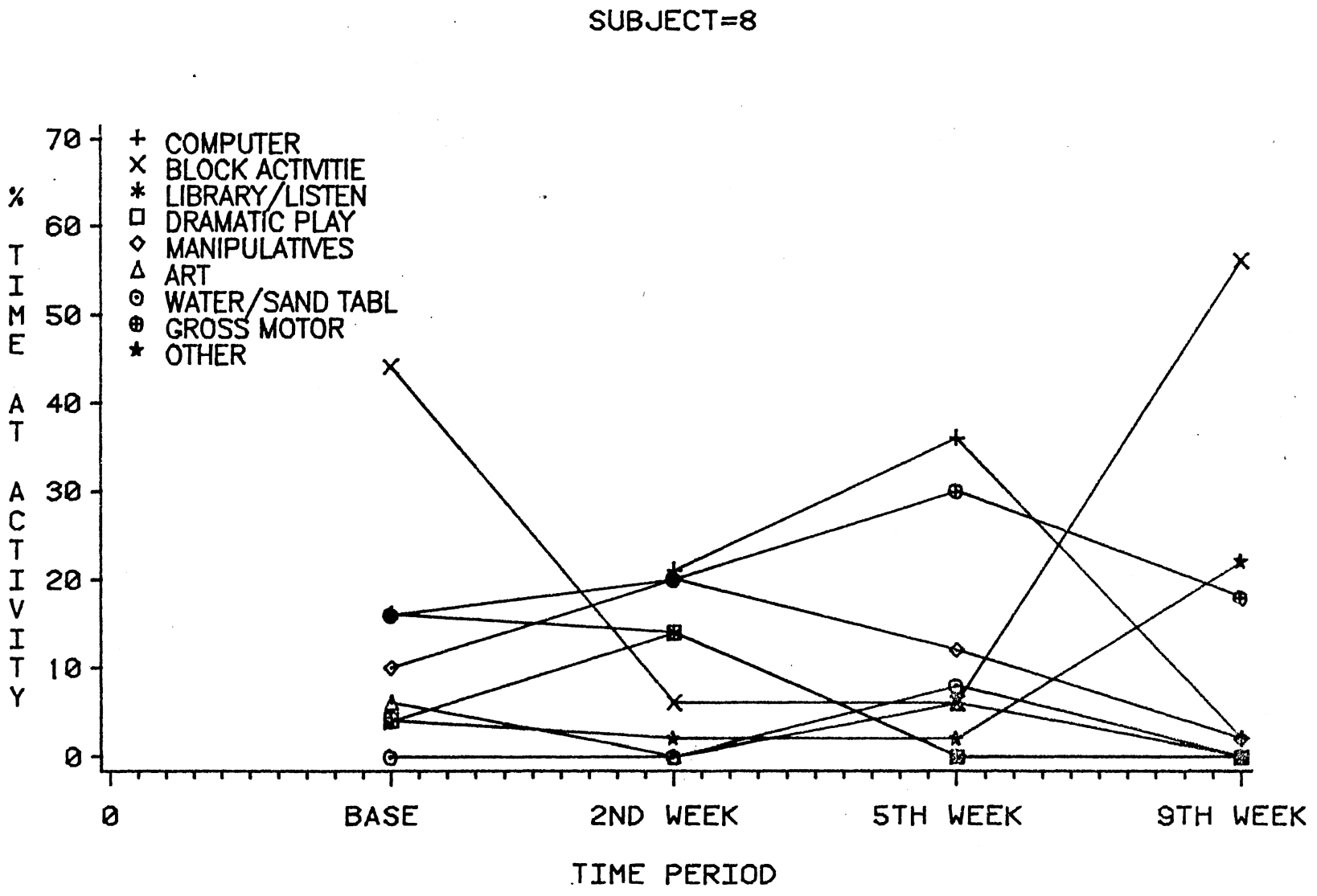
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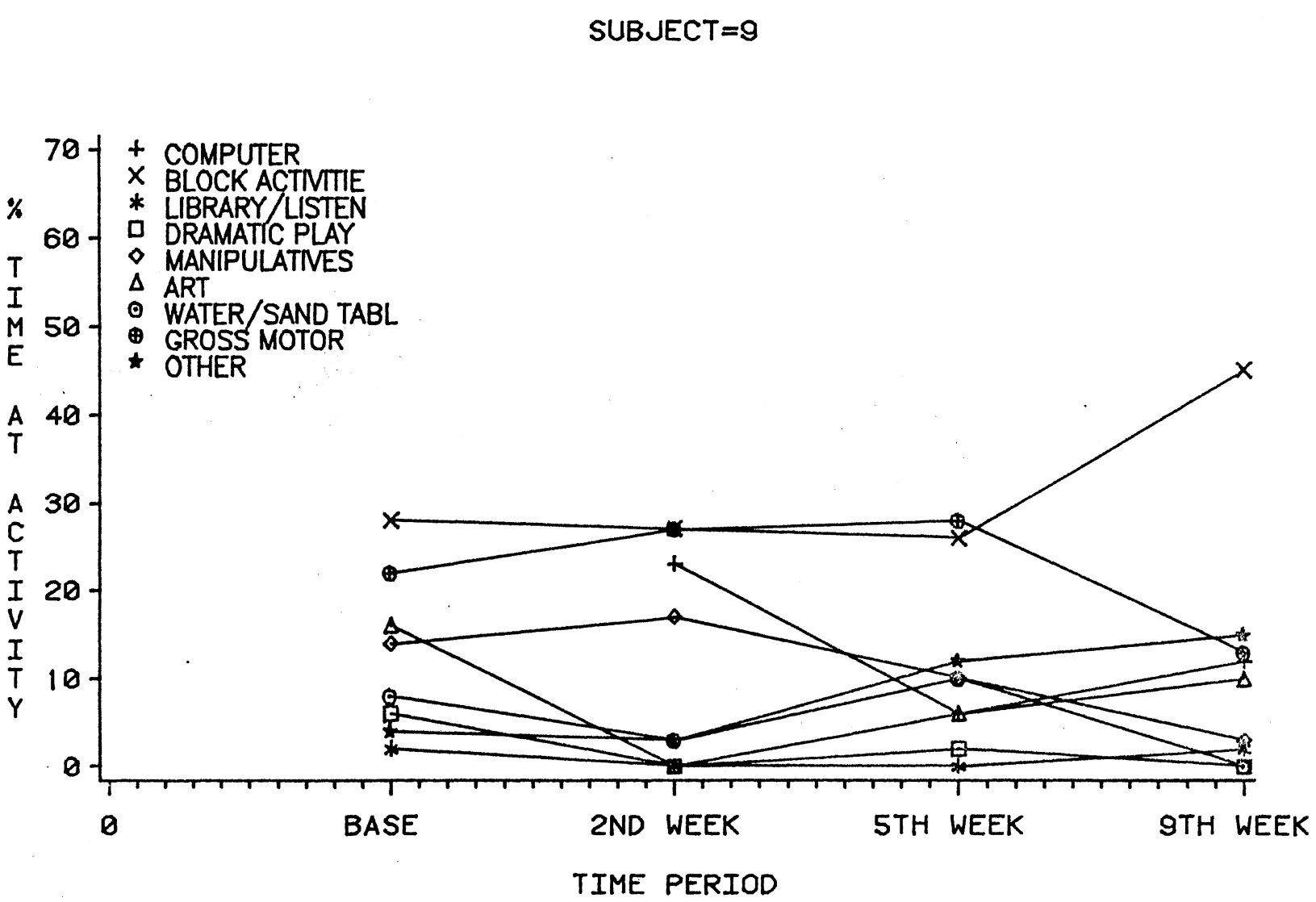
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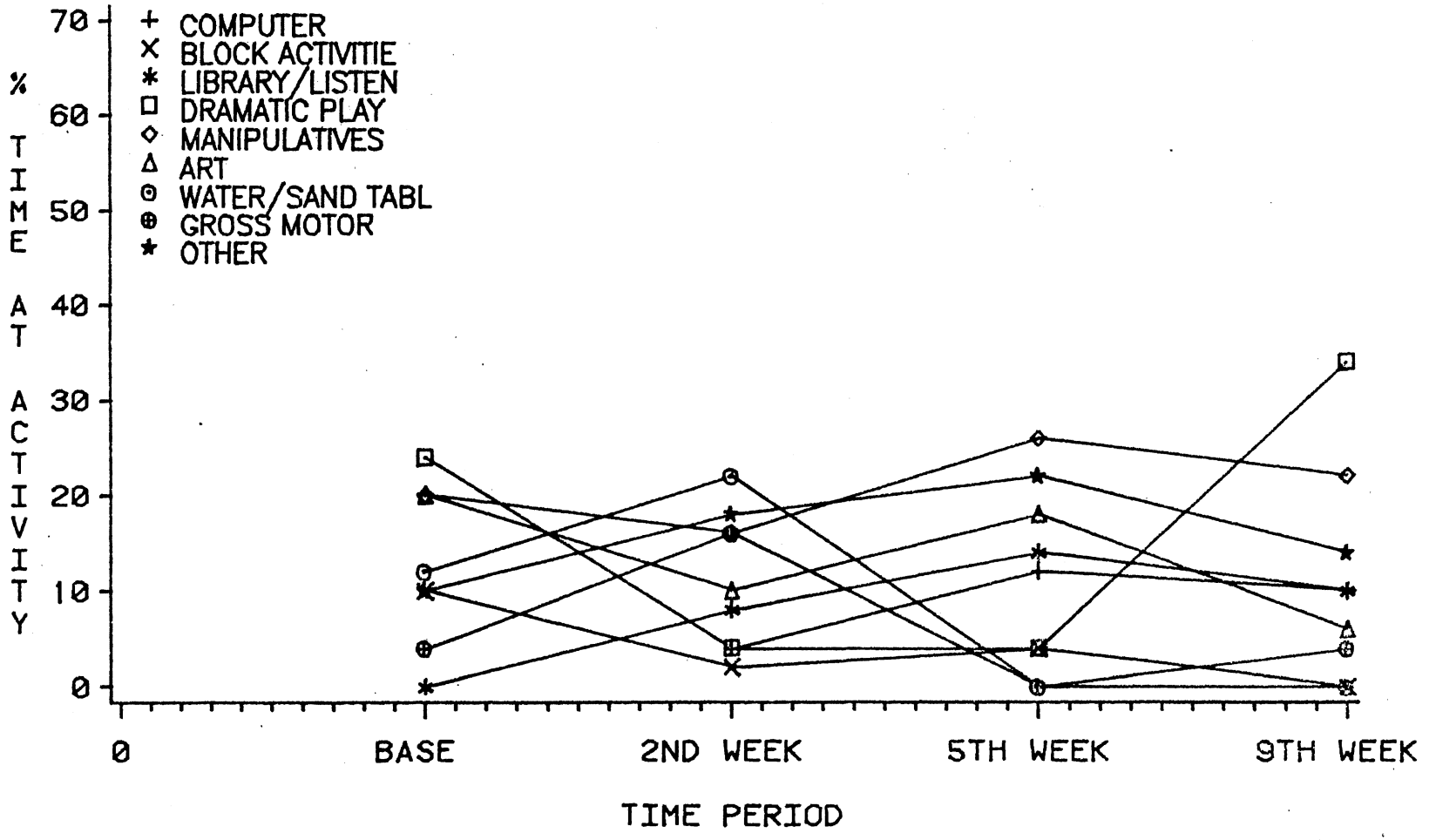
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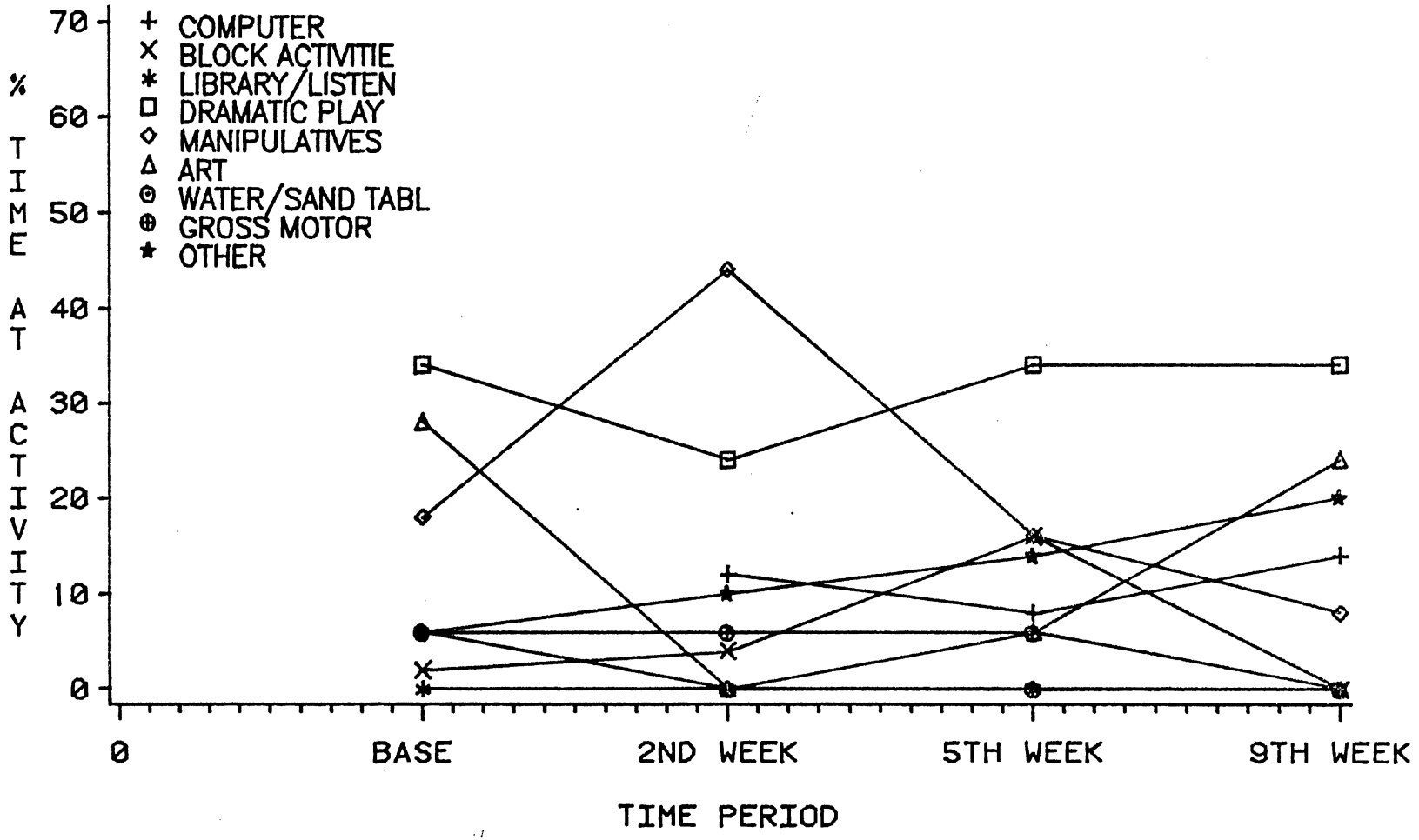
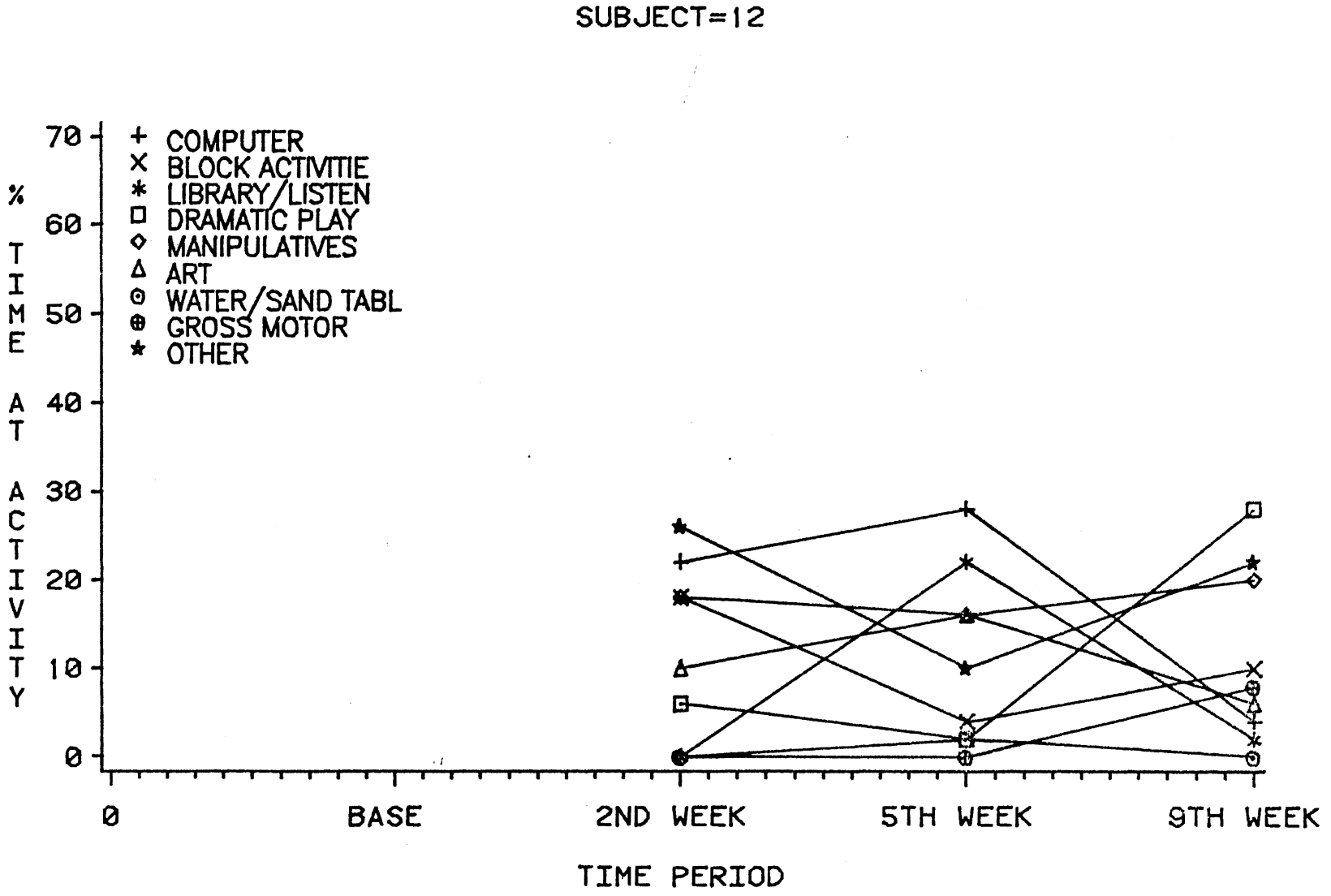
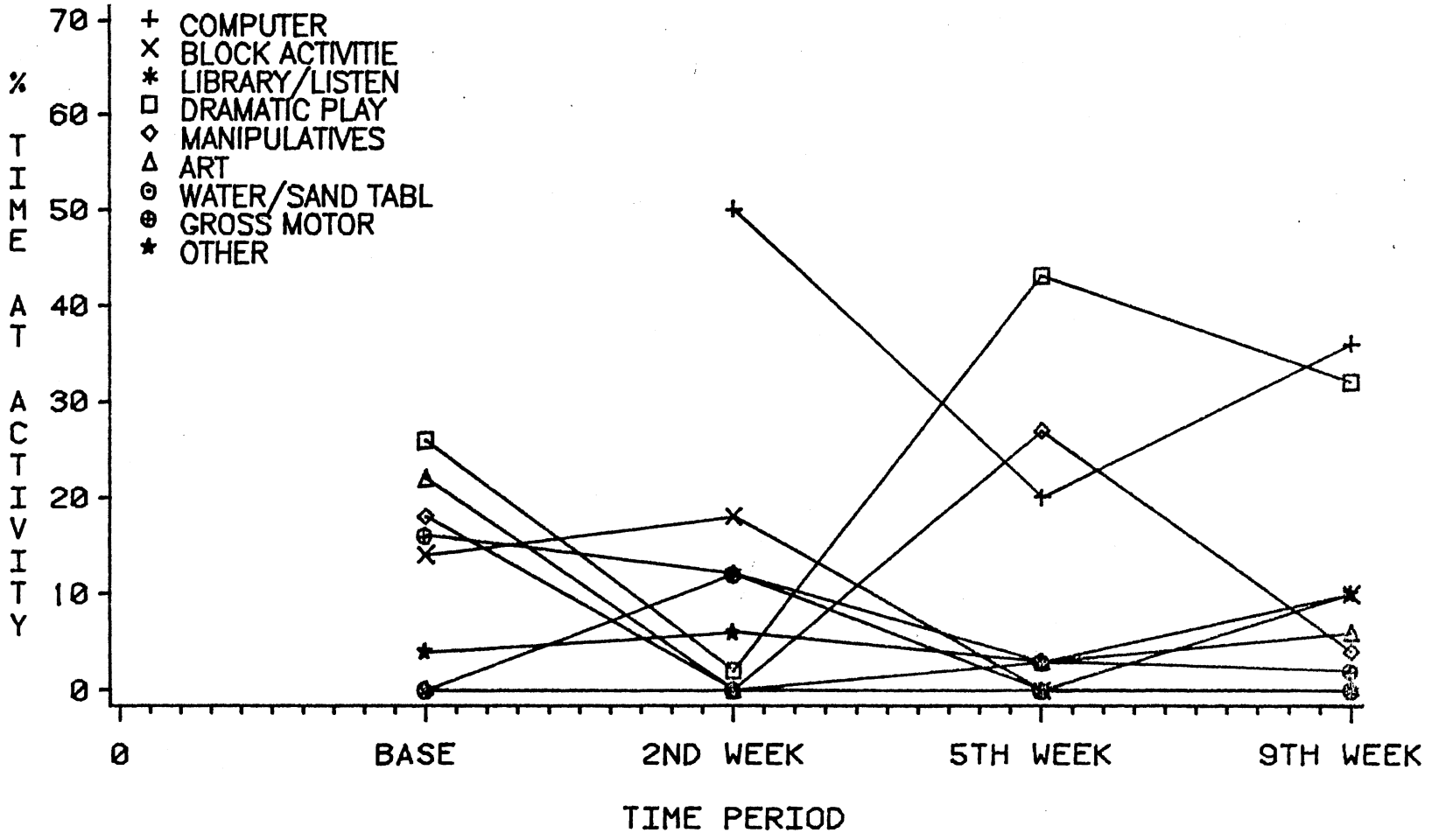
TIME PERIOD

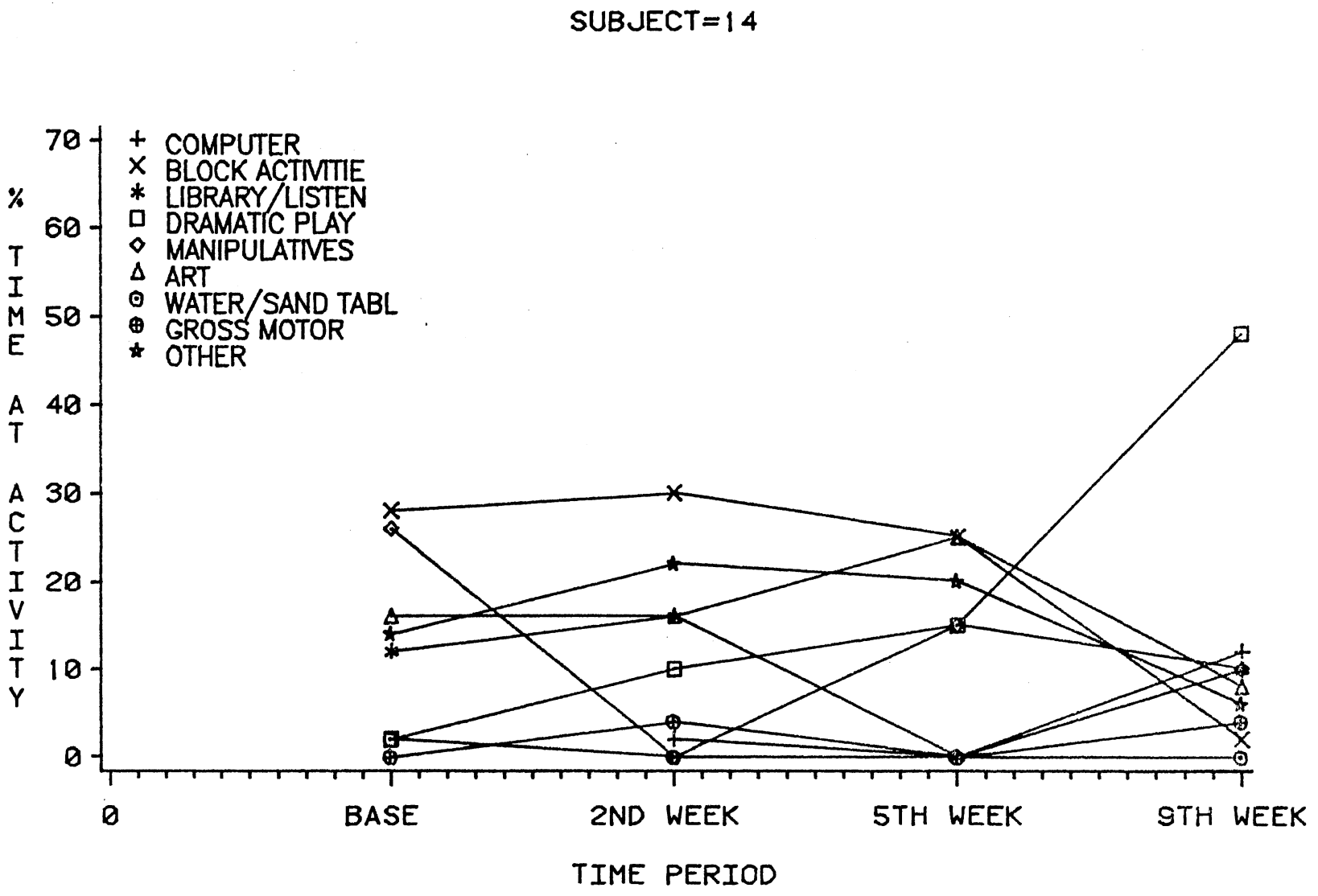
SUBJECT=11


70
60
50
40
30
20
10
0
% TIME AT ACTIVITY
+ COMPUTER
× BLOCK ACTIVITIE
* LIBRARY/LISTEN
□ DRAMATIC PLAY
◇ MANIPULATIVES
△ ART
⊙ WATER/SAND TABL
⊕ GROSS MOTOR
★ OTHER
0
BASE
2ND WEEK
5TH WEEK
9TH WEEK
TIME PERIOD


SUBJECT=12
70
60
50
40
30
20
10
0
% TIME AT ACTIVITY
+ COMPUTER
× BLOCK ACTIVITIE
* LIBRARY/LISTEN
□ DRAMATIC PLAY
◇ MANIPULATIVES
△ ART
⊙ WATER/SAND TABL
⊕ GROSS MOTOR
★ OTHER
0
BASE
2ND WEEK
5TH WEEK
9TH WEEK
TIME PERIOD

SUBJECT=13


+ COMPUTER
X BLOCK ACTIVITIE
* LIBRARY/LISTEN
□ DRAMATIC PLAY
◇ MANIPULATIVES
△ ART
⊙ WATER/SAND TABL
⊕ GROSS MOTOR
★ OTHER
% TIME AT ACTIVITY
70
60
50
40
30
20
10
0
0
BASE
2ND WEEK
5TH WEEK
9TH WEEK
TIME PERIOD


SUBJECT=14
% TIME AT ACTIVITY
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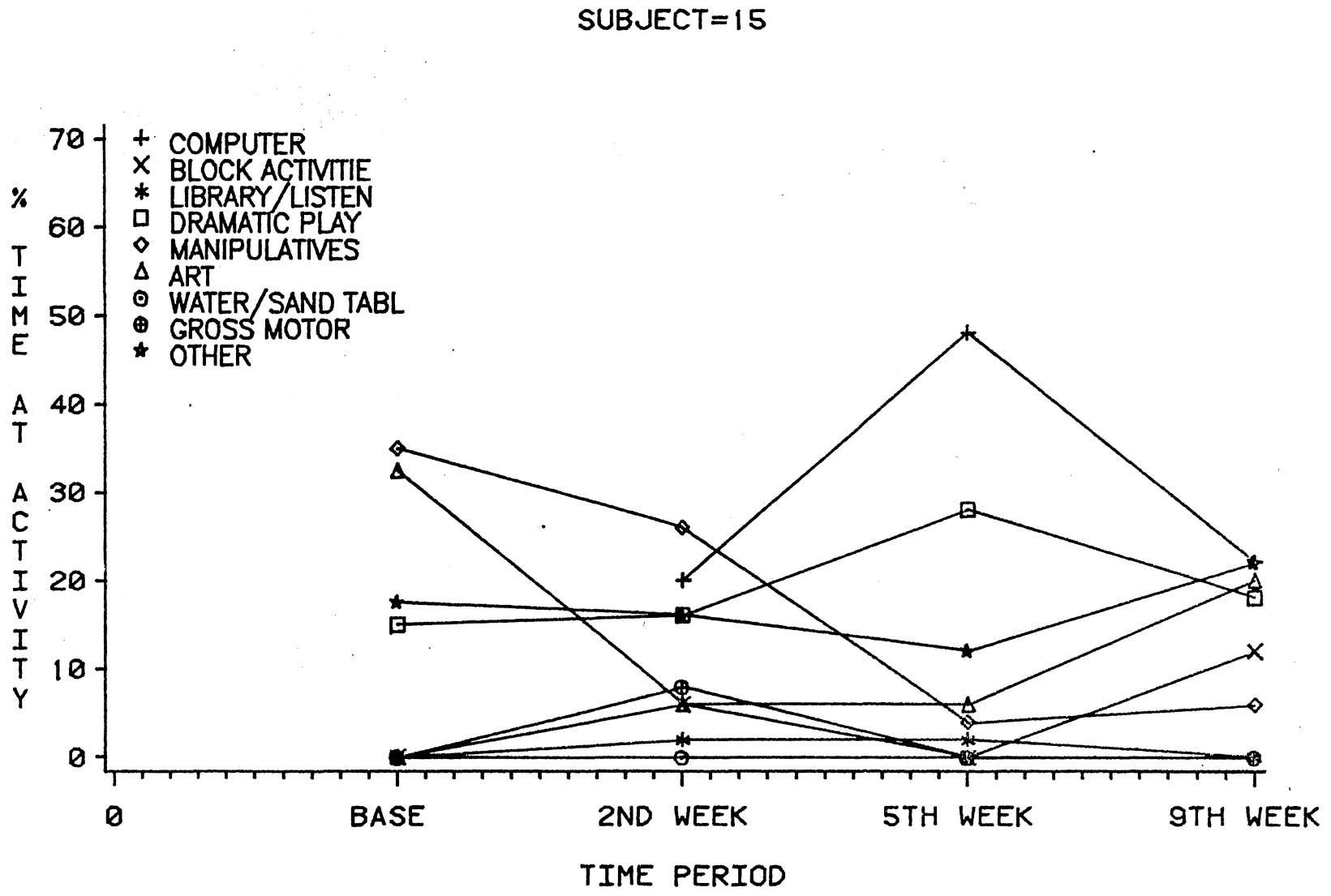
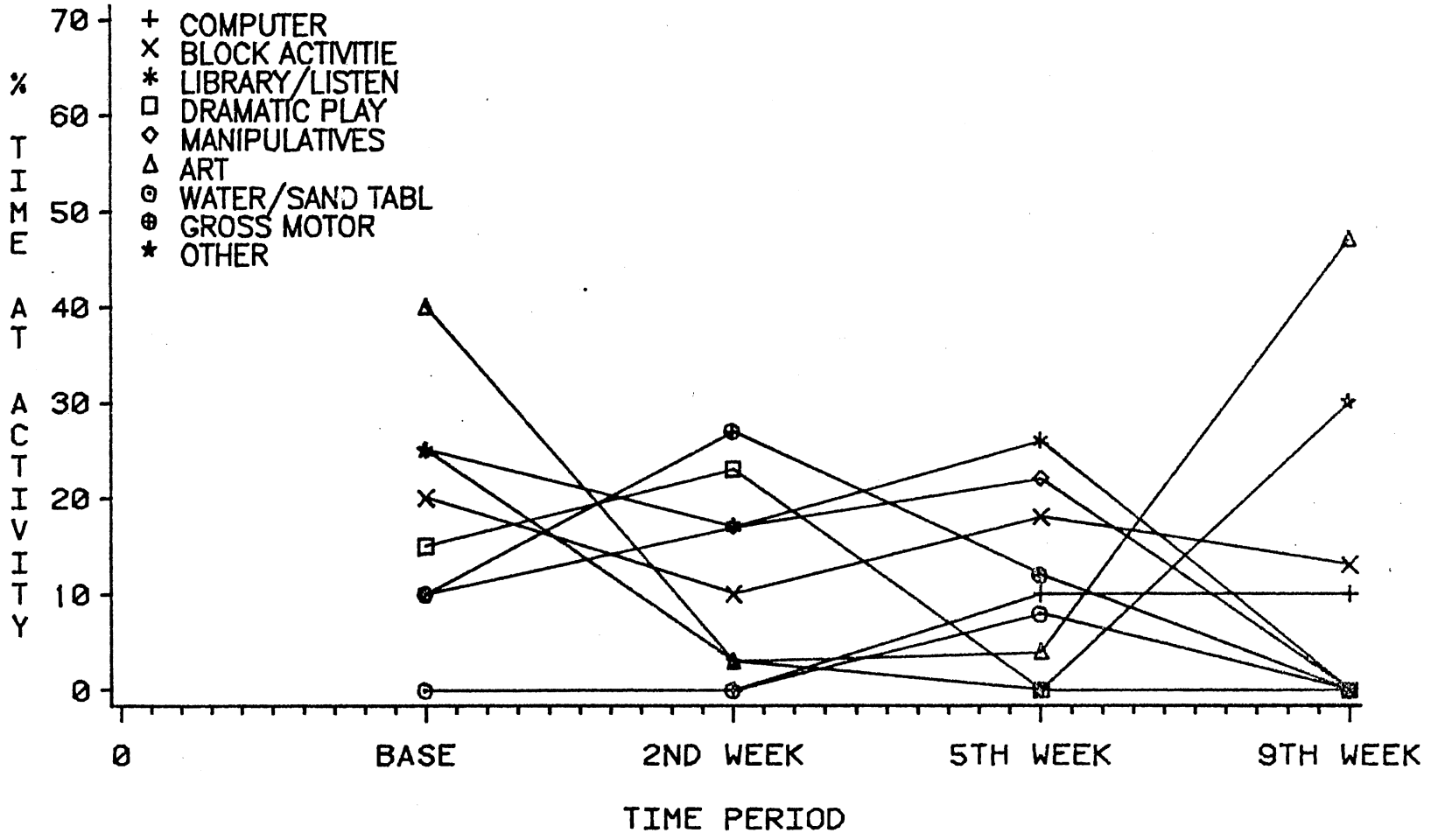
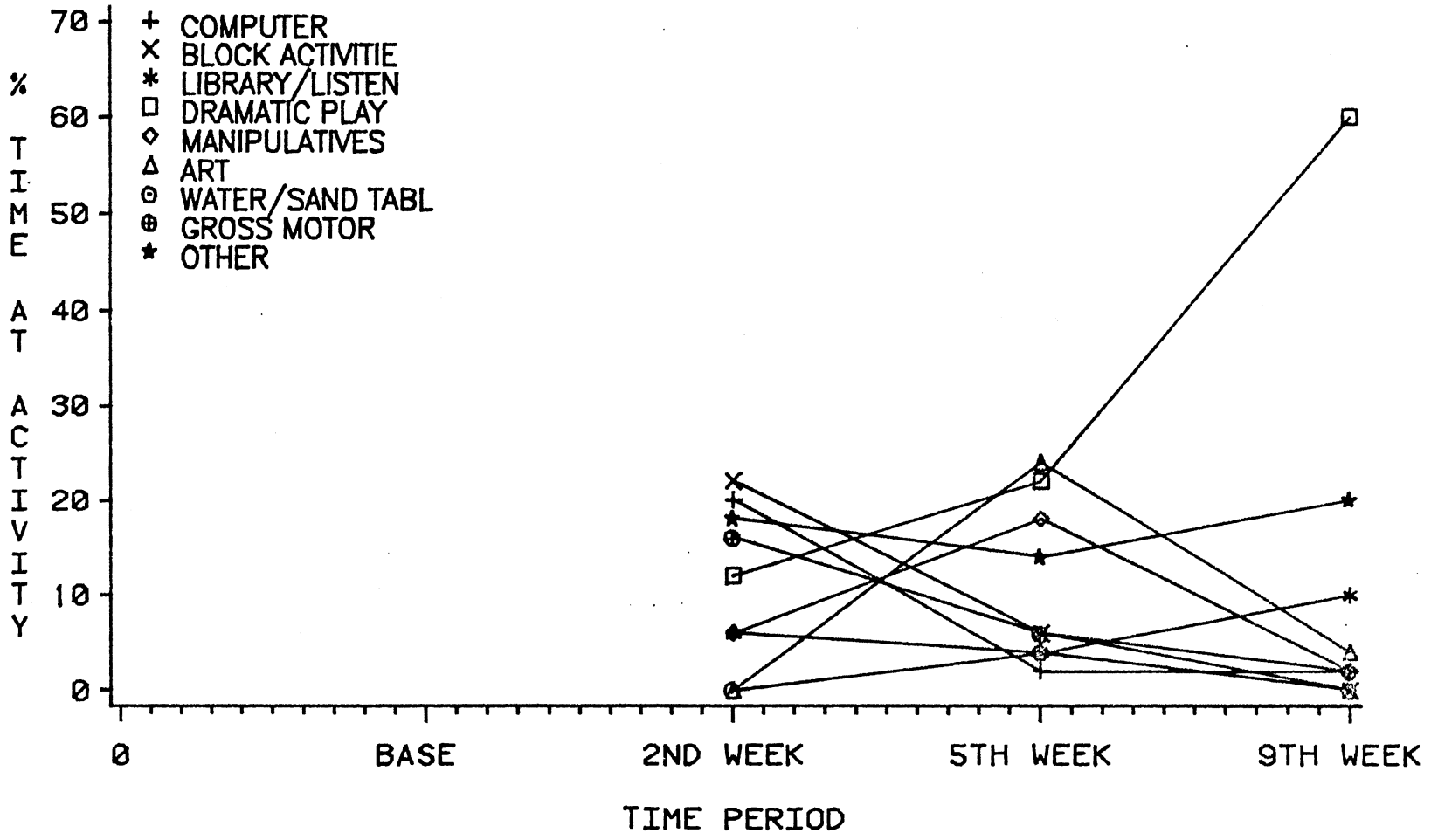
60
50
40
30
20
10
0
+ COMPUTER
X BLOCK ACTIVITIE
* LIBRARY/LISTEN
□ DRAMATIC PLAY
◇ MANIPULATIVES
△ ART
⊙ WATER/SAND TABL
⊕ GROSS MOTOR
★ OTHER
0
BASE
2ND WEEK
5TH WEEK
9TH WEEK
TIME PERIOD


SUBJECT=15
% TIME AT ACTIVITY
70
60
50
40
30
20
10
0
+ COMPUTER
× BLOCK ACTIVITIE
* LIBRARY/LISTEN
□ DRAMATIC PLAY
◇ MANIPULATIVES
△ ART
⊙ WATER/SAND TABL
⊕ GROSS MOTOR
★ OTHER
0
BASE
2ND WEEK
5TH WEEK
9TH WEEK
TIME PERIOD

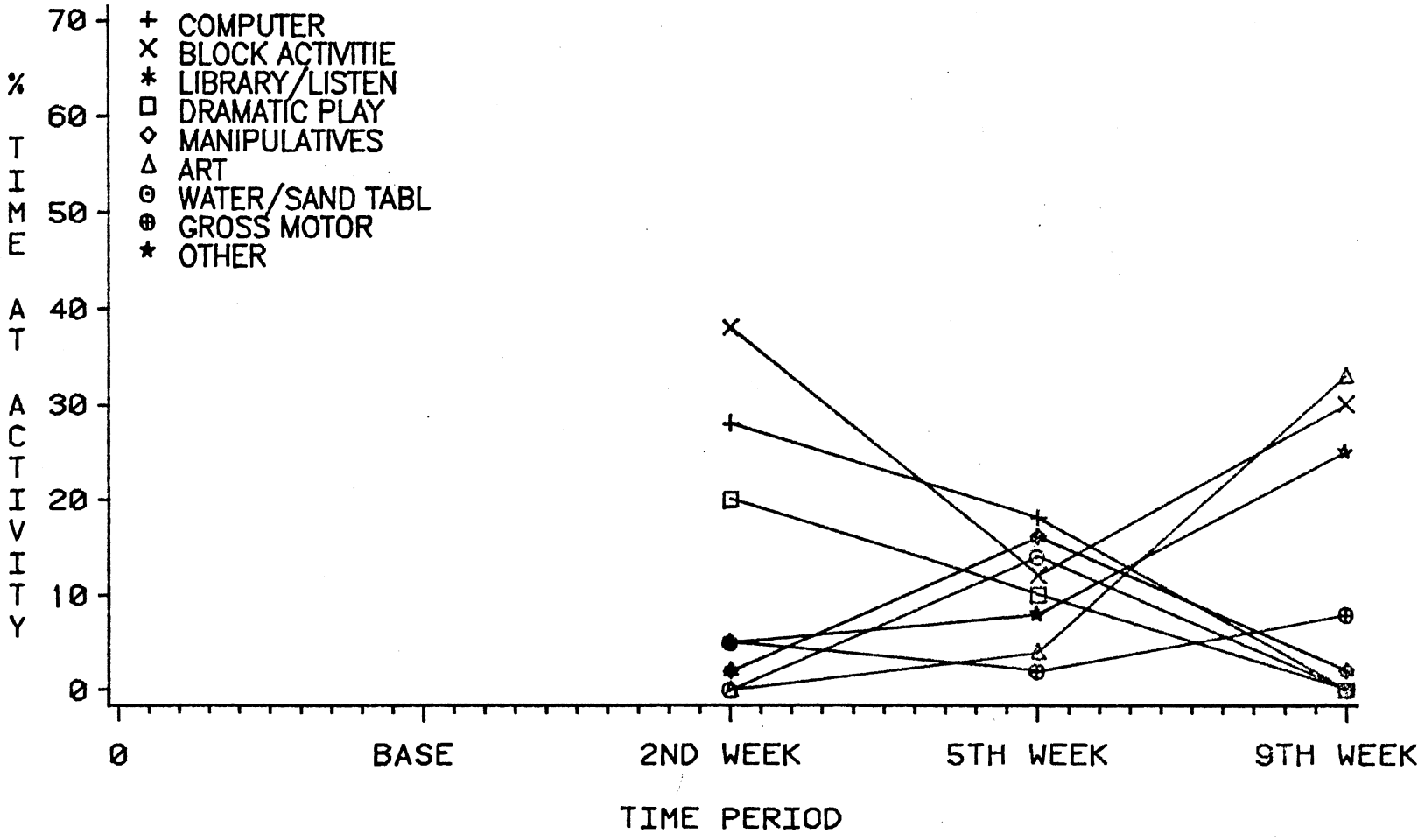
SUBJECT=16


+ COMPUTER
X BLOCK ACTIVITIE
* LIBRARY/LISTEN
□ DRAMATIC PLAY
◇ MANIPULATIVES
△ ART
⊙ WATER/SAND TABL
⊕ GROSS MOTOR
★ OTHER
% TIME AT ACTIVITY
70
60
50
40
30
20
10
0
0
BASE
2ND WEEK
5TH WEEK
9TH WEEK
TIME PERIOD

SUBJECT=17


+ COMPUTER
× BLOCK ACTIVITIE
* LIBRARY/LISTEN
□ DRAMATIC PLAY
◇ MANIPULATIVES
△ ART
⊙ WATER/SAND TABL
⊕ GROSS MOTOR
★ OTHER
% TIME AT ACTIVITY
70
60
50
40
30
20
10
0
0
BASE
2ND WEEK
5TH WEEK
9TH WEEK
TIME PERIOD

SUBJECT=18


+ COMPUTER
× BLOCK ACTIVITIE
* LIBRARY/LISTEN
□ DRAMATIC PLAY
◇ MANIPULATIVES
△ ART
⊙ WATER/SAND TABL
⊕ GROSS MOTOR
★ OTHER
% TIME AT ACTIVITY
70
60
50
40
30
20
10
0
0
BASE
2ND WEEK
5TH WEEK
9TH WEEK
TIME PERIOD

VITA

Kathleen Lynn Rutledge

Candidate for the Degree of

Master of Science

Thesis: THE EFFECT OF A MICROCOMPUTER ON PRESCHOOL CHILDREN'S SELECTION OF INTEREST CENTERS

Major Field: Family Relations and Child Development

Biographical:

Personal Data: Born in Edgerton, Wisconsin, July 19, 1948, the daughter of J. Franklin and Ardith H. Bradley. Married to James A. Rutledge on July 5, 1969.

Education: Graduated from Evansville High School, Evansville, Wisconsin, in June, 1966; received Bachelor of Science Degree in Home Economics with emphasis in Child Development from University of Wisconsin-Madison in June, 1970; attended University of Wyoming, 1982-1984; completed requirements for Master of Science Degree at Oklahoma State University in May, 1987.

Professional Experience: Teacher of kindergarten at Fort Bragg, North Carolina, 1970-1971; Teacher's aide and substitute teacher, Wisconsin State School for the Deaf, Delevan, Wisconsin, 1972-1977; Substitute teacher, Cheyenne, Wyoming, 1978-1980; Teacher of Head Start, 1980; Director of Nurture House Day Care Center, Cheyenne, Wyoming, 1980-1982; Graduate Teaching Assistant, Oklahoma State University Child Development Laboratories, 1984-1985; Supervising Teacher, Oklahoma State University Child Development Laboratories, 1986; Director of YMCA Child Care Program, Stillwater, Oklahoma, 1986-present.

Professional Organizations: National Association for the Education of Young Children; Oklahoma Association for the Education of Young Children; Southern Association of Children Under Six; Oklahoma Association for Children Under Six; Oklahoma Friends of Day Care.