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A Comparison of Traditional Preschool and Computer Play from a Social/Cognitive Perspective

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A COMPARISON OF TRADITIONAL PRESCHOOL AND COMPUTER PLAY FROM A SOCIAL/COGNITIVE PERSPECTIVE

by

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Jeanne M. Hoover

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ABSTRACT

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Twenty females and twenty-three males from the Utah State University Children's House participated in this study which compared traditional preschool play with computer play. The Parten/Smilansky nested social/cognitive play hierarchy was used. Sociometric and cognitive assessments were incorporated in order to more clearly define behaviors. Five types of play were observed: computer, art, locks, manipulative toys, and the dramatic area.

No gender differences were found in terms of the amount of time or type of play at the computer. However, sociometric status did influence computer play. Children who engaged in more positive social interactions used the computer constructively, while those who engaged in more negative interactions used the computer in a more dramatic fashion. Duration of play at the computer was similar to duration of play with blocks and art activities, but different from duration of play with manipulative toys and in the dramatic area. Group play was the most common

level of social play observed at all types of play centers, including the computer center, suggesting that computers do foster socialization in young children. Summing across all centers, including the computer center, constructive play was the most prevalent type of cognitive play observed. When each center was analyzed individually, games with rules, the highest level of cognitive play, was observed significantly more often at the computer center. Thus, computers may be fostering higher cognitive levels of play.

(97 pages)

CHAPTER I

INTRODUCTION AND STATEMENT OF PROBLEM

Children's play has been a controversial area of investigation over the past century. While the research scope has indeed been broad, what is most apparent is that inconsistencies exist between the differing theories of play. Some theories focus on the emotional aspects of play, while others consider social or cognitive elements or combinations of the three. While there may be overlaps in some of these perspectives, distinct differences exist in the general viewpoints (Rubin, Fein, & Vandenberg, 1983). The lack of agreement about theories regarding play is also reflected in the lack of agreement upon a definition. "Play seems to represent that definitionally impossible 'wastebasket' category of behavior" (Gilmore, 1971, p. 311). Researchers have tried to clarify play by identifying dispositions, functions, behaviors, and the context associated with play in order to attempt definition but also to distinguish play from non-play. Again, wide differences of opinion exist.

Educators generally believe that preschool children

learn through play and that play opportunities emanate from their environment. Computers are increasingly more apparent in the preschool environment with predictions indicating even greater use with time. However, the impact of the computer as part of the preschool play environment remains virtually unknown. Uncertainty exists regarding the proper role of computers. Fear is voiced that traditional classroom activities will be replaced rather than complemented by the computer. Little is known about how preschoolers most effectively use the computer and what types of social and cognitive behaviors take place at the computer. Since play is important to youngsters, a need exists to address whether activities at the computer can be considered as play and, if so, what kind of play?

This study proposes to compare the nature of preschool play with and without the computer. The author has chosen a social-cognitive framework utilizing the variables of sex differences, duration of play, cognitive abilities, and sociometric status. The inclusion of both sociometric status and cognitive levels should provide a clearer understanding of computer play because children's friendship patterns and intellectual abilities, often an integral feature in play, will be defined.

The literature is replete with praise and critiques of the computer revolution, but offers little in the way of applicable scientific research. However, the focus of

future research appears to be more scientific rather than descriptive. Viable uses of the computer with preschoolers need to be investigated in order to better understand computer utilization.

CHAPTER II

LITERATURE REVIEW

Play

The study of play has its roots in the eighteenth century resulting in four classical theories of play. Although much disagreement exists regarding these theories, they include: the surplus energy theory of play, the relaxation theory, the practice theory, and the recapitulation theory of play (Rubin et al., 1983). All four theories emphasize emotion, cognition, or socialization, either singly or in combinations as defining factors in play.

A brief reference to these four theories is necessary to provide some background information and as a means of clarifying more modern views of play. The surplus energy theory has its beginnings in Schiller's (1954) writings, where play is equated with the release of extra energy after one's basic needs have been met. Play is the means by which one escapes reality and gains a new symbolic view of life through the release of surplus energy. Cognition plays a part in this transformation of reality into new symbolic representations. In contrast, the relaxation

theory of play, developed by Lazarus (1883), attributes play not to a surplus, but to a lack of energy. Play is considered an instinctive need, to relax from the stress of living. Emotional release serving a restorative function is evident in his theory.

The practice theory of play (Groos, 1901) emphasizes the adaptive nature in which the young practice at different developmental levels the future skills necessary for adult life. This theory combines elements of cognition and socialization.

The final theory, recapitulation, has its roots in Darwinian theory (1872). Play is regarded as fulfilling a cathartic role. Children are the link between animals and adults with their play being representative of this evolutionary history. Socialization, emotion, and cognition are all combined to some degree in this theory.

Despite the differences associated with these classical theories of play, their influence upon modern studies of play has been substantial. The psychoanalytical perspective draws on the relaxation theory of play in which one relaxes from the stress of living. Freud (1959) advocated that play was an avenue of escape from reality for children to express their emotions, while Erickson (1951) emphasized the use of toys and space as an important play dimension. This later led to the development of play therapy with children to overcome their emotional problems.

While psychoanalytical views favor the emotional aspects of play, the cognitive influence of the surplus energy theory is evident in Piaget's work dealing with the acquisition of symbolic representation. The cognitive and social elements of practice theory, reflected in successive developmental stages, has also influenced Piaget's theory of play. According to Piaget (1966),

> Play is an exercise of action schemes and therefore part of the cognitive component of conception. At the same time, however, play manifests the peculiarity of a primacy of assimilation over accommodation which permits it to transform reality in its own manner without submitting that transformation to the criterion of objective fact. (pp. 111-112)

Piaget's identification of stages of cognitive development is carried over into his identification of play categories: practice play, symbolic play, and games with rules.

Piaget (1962) describes practice play as the repetitive exercising of behaviors for no other purpose than the pleasure of functioning itself. While practice play is similar to animal behaviors, symbolic play does not exist among animals due to the fact that it is more cognitively mature, involving thought and representation. Games with rules is successively more complex than practice or symbolic play since it implies a social acceptance of imposed rules.

The work of Sutton-Smith (1967) reflects both the recapitulation and practice theories of play. He

emphasizes the adaptive nature of play in which the child develops new ideas and associations by experimenting with various play behaviors. The author tentatively concludes that a functional relationship exists between cognitive development and play.

The comparative approach, according to Herron and Sutton-Smith (1971), examines animal play as a means of understanding human play, thereby reflecting the recapitulation theory of play. An emphasis exists regarding the social nature of play since different types of play encourage different social interactions. According to Beach (1945), play is pleasurable, species specific, more often engaged in by the young, and without purpose other than for its own sake.

Some developmentalists would disagree that play is non-productive, however part of this problem may lie in semantics. Strong opinions exist concerning the definition of productivity and its role in play. The process itself might be more important than the end product of play, according to Bruner (1972) and Miller (1973).

The many diverse opinions regarding play illustrate why there is no one theory or generally accepted definition. However, the recurring themes of socialization, cognition, and emotion are generally evident in the study of play.

Gilmore (1971) acknowledges the ambiguous nature of

play. The suggestion is made that researchers attempt to clarify their particular definitions of play in order to lessen confusion.

Fein (1978) supports the views of Gilmore, asserting that play is complex because so many different behaviors can be termed as play. She suggests that it would be easier to describe play "by what it is not than what it is" (p. 71). The author mentions that socialization, emotion and cognition are interwoven within the rubric of play.

In order to clarify this particular play study, the focus will be on two aspects of play, social and cognitive. Both themes are evident, either singly or together, in the play literature in general. The computer-related literature also carries both social and cognitive themes, as well as describing young children's use of the computer as play.

Further delimiters of play used in this study will include active, free-choice play that is enjoyable. It is assumed that if young children are not enjoying their play activity, they will choose something else. This descripters of play are often represented in the play literature; play is active; play is voluntary; play is enjoyable (Gilmore, 1971; Sutton-Smith, 1977; Garvey, 1977).

In play situations, certain social interactions occur; children may play alone, ear others, with others,

watching others, or engaged in unoccupied behaviors. Within each social category, different types of cognitive play are observable. The play may include repetitive movements of materials, constructing with materials, dramatic and verbal fantasizing, or playing games with specific rules.

The dual observation of social and cognitive play categories will be incorporated into this study in order to better understand the nature of play. The additional assessment of cognitive ability and sociometric status will provide further information in order to clarify play behaviors.

Social and Cognitive Play

Social Play

Over fifty years have elapsed since Parten's (1932) now classic study was done on the social play of forty-two preschool children at the Nursery School of the Institute of Child Welfare at the University of Minnesota. Parten developed six categories of play, unoccupied, solitary, onlooker, parallel, associative, and cooperative, known as the Parten Social Participation Measure, in order to evaluate both the intensity and extensity of preschool social play. Using these categories of play, Parten coded the behaviors observed during free play. Her conclusion,

that preschooler's social participation increases with the child's age, led to her classification of different types of play. Parten's categories have been widely accepted and have had a strong influence upon the child development literature, although her study has been criticized due to the small number of observations taken for each child and an unequal number per child. Another methodological flaw is the lack of documentation for intelligence measures employed. However, this initial attempt to correlate social play with cognitive assessments has influenced the nature of later play studies.

In 1971, Barnes replicated the Parten study with forty-two preschool rural Canadian children. Barnes did not use any intelligence assessment measures which he attributes to a flaw in Parten's methodology. Barnes found that young children in the seventies were less skillful socially than their contemporaries of the twenties. Barnes explained these differences may be due to the effect of technology in the development of modern toys and media, such as television, which encourages more solitary play and less social interaction with peers. A similar issue is now surfacing as computers are found more often in the preschool. Will computers eliminate social play and produce social isolates as some fear? Thus, the concern is valid that computer play may differ from other types of play and may have consequences for young children of this generation.

Nonetheless, Barnes' findings may be spurious in some ways. Vandenberg (1981) asserted that the Barnes study did not control for the types of play materials used and this may have caused the discrepancy between the findings of Parten and Barnes. Parten made a passing reference to the following play activities in her study: playing in the sandbox, playing with kiddie-kars, painting water-color pictures, washing doll's clothes and making valentines (Parten, 1932). However, Barnes, in describing the play setting in his study, did state: "This free-play period was almost identical to the nursery school play period described in Parten's article (p. 248)" (Barnes, 1971, p. 99). Barnes failed to elaborate any further on the specific play activities involved. Another problem with the Barnes study is that his conclusions indicate sweeping generalizations about children of the seventies all based on one study of forty-two children.

Although these early studies focussed on social play, they did not incorporate any sociometric status assessments to clarify social play behaviors. However, these studies are valuable for they provided a base from which to launch further play studies.

Cognitive Play

While the social elements associated with play are extremely important, the cognitive aspects are of equal importance. The early work of Piaget (1962) in

classifying three cognitive stages of children's play, sensorimotor, symbolic, and games with rules, has been categorized into an ontogenetic sequence of behaviors by Smilansky (1968). This hierarchy of cognitive play categories includes: functional play, constructive play, dramatic play, and games with rules. Smilansky's development of cognitive play categorization led to the nested use of the Parten/Smilansky hierarchies of play which have served as the framework for numerous child play studies (Rubin, Maioni & Hornung, 1976; Rubin, Watson & Jambor, 1978; Johnson, Ershler & Bell, 1980; Johnson & Ershler, 1981; Rubin, 1982; Rubin & Daniels-Beirness, 1983).

The observation of both social and cognitive levels of play within a single study, by the very nature of the complex interrelationships involved, lends itself to provide more complete information regarding preschool play.

Social/Cognitive Play

Rubin, Maioni and Hornung (1976), using the Parten/Smilansky Scales, compared the free play behaviors of fifty lower and middle class preschoolers enrolled in the University of Waterloo Early Childhood Education Center. The study did not employ additional assessments other than the Parten/Smilansky play categories. Also, there was no specific mention of any play materials. The results indicated strong social class and sex differences in play. This contrasts with the findings of Parten (1932), Smilansky (1968), and Barnes (1971) in which no sex differences were reported. Females engaged in more solitary and parallel constructive behaviors than males. This supports an earlier study of kindergarten play (Moore, Evertson & Brophy, 1974) in which females engaged in more solitary "educational" play. The study also noted occasions of cooperative play, a finding which compares with those of Parten (1932) and Barnes (1971).

Johnson, Ershler and Bell (1980), also using the Parten/Smilansky scales, studied eighteen children enrolled in two different types of preschool programs, formal and discovery based. No measures of cognitive abilities or sociometric status were used. The only reference to play materials was the mention of realistic and unstructured toys. The social levels of play in the two programs did not differ, however cognitive differences

in play were observed. The formal program produced more constructive play, perhaps due to its goal-oriented philosophy, while the discovery-based program produced more functional play, perhaps due to its exploratory nature. Environments do influence the structure of play. This has implications which deserve further study regarding the use of computers in the play environment.

Although generalizability is poor due to the small number of subjects, Johnson et al. (1980) point out that solitary play may be more cognitively mature than parallel play. Both older and younger children were as likely to be involved in solitary play, whereas parallel play was chiefly engaged in by younger children. This deserves notice in that educators and psychologists have long held that parallel play was more advanced than solitary. It may also have implications regarding computer use in play settings where the computer serves as a free choice center.

Computer play, in fact, may represent a change in play behaviors. In discussion of the Parten/Smilansky play categories, Rubin et al. (1976) point out that "games with rules," due to its very nature, could not be considered as solitary or parallel play. Games with rules could only be classified as group play.

Piaget (1962) states, "[games with] rules necessarily imply social or inter-individual relationships....Rules are a regulation imposed by the group, and their violation

carries a sanction" (pp. 112-113). Smilansky (1968) describes games with rules as the highest level of play, where the child acts and reacts to given rules. While this description may imply social interaction, it is not specifically stated.

It is interesting to note that a more recent play study (Rubin & Daniels-Beirness, 1983) includes games with rules in all three social play categories, solitary, parallel, and group. In order to investigate play more thoroughly, games with rules will be incorporated into the three social categories in this study.

Computers may produce different play behaviors. Due to the interactive nature of computers, "social" or "inter-individual relationships" may take place with the computer, instead of the group. When engaged in solitary or parallel play at the computer, the child can interact, get feedback, play by the rules imposed by the computer, and suffer the consequences when certain rules are not followed. Indeed, computer play may differ from the more traditional types of group play involving games with rules.

Obviously, this view of play represents a departure from traditional viewpoints. Due to the highly controversial nature of play, the lack of consistent definitions, and diverse theories, many would disagree that computers can be used in play. Moreover, can computers be used in a social/cognitive categorization of

play? However, since computers are being rapidly introduced into the preschool play environment, all aspects of that play need to be investigated. The first step is to find out if play behaviors at the computer are similar to or different from play behaviors with other preschool materials.

This study proposes to undertake a project which has not been attempted previously, but which needs to be addressed due to the advance of technology into the classroom. This research will use the Parten/Smilansky scales in conjunction with intelligence and sociometric status assessments and apply them to both computer play and traditional play.

Play Environments and Materials

Another aspect of play that has produced considerable research is the play environment and materials. Socialization has far-reaching implications within the play environment and the nature of the play materials themselves. In 1981, Vandenberg used the Parten categories to examine the environmental and cognitive factors in young children's social play. The study observed twenty-eight urban preschoolers in two distinct play environments: one involving large motor exercise and the other, small motor exercise. Vandenberg found no evidence of cooperative play, a finding which contrasts with those of Parten (1932) and Barnes (1971). One reason

for this discrepancy, according to Vandenberg, was that the play environment did not include any materials which would foster cooperative play, such as puppets or dolls. The play materials specified in the small motor environment included: paper, pencils, crayons, scissors, and paste. In this environment, more solitary and parallel play behaviors were observed.

The children were measured not only on the Parten scale, but also on cognitive abilities and social egocentrism. The addition of cognitive and social assessment helped to define play in this study. Social play was strongly influenced by play environments, while differences in cognitive and social development influenced the child's choice of play (Vandenberg, 1981).

This compares favorably with the study of Quilitch and Risley (1973) in which children's social behaviors were dramatically influenced by the nature of the play materials. The twenty-four participants were seven years old and attended a Kansas City recreation center. The study compared "isolate" toys, those played with by one child, and "social toys," those played with by two to four children at a time. Some of the "isolate" toys mentioned were: crayons, Playdoh, Tinker Toys, and puzzles. Some of the "social" toys included: checkers, Pick Up Stix, Don't Spill the Beans, and playing cards. The authors suggest that the types of toys did influence the amount of time children spent playing together. When playing with

"isolate" toys, the observation of cooperative behaviors averaged 22%, 11%, 15%, and 30% of the time, whereas play with "social" toys produced observations of cooperative play behaviors averaging 61%, 67%, 77%, and 88% of the time. The amount of cooperative behaviors dramatically increased when children used "social" toys.

In 1982, Rubin studied the play behaviors of 122 Canadian four year olds, using the Parten/Smilansky play hierarchies. The author vaguely referred to the use of puzzles, but did not delineate in what capacity they were used. The suggestion that art activities and small manipulative toys may produce more solitary play supports the views of Vandenberg (1981).

Rubin and Daniels-Beirness' study (1983) also utilized the Parten/Smilansky scales. This was a longitudinal study of seventy-two participants, first tested in kindergarten, and again, in first grade. No mention was made of any specific play materials. A major methodological flaw exists in many of the classic play studies due to the lack of specificity regarding toys and play environments. Since different types of toys and play environments may produce different kinds of play behaviors, it is important to address this issue.

This leads one to wonder whether a computer in the preschool environment would be classified as an "isolate" or "social" activity. Do young children tend to use the computer as a solitary or a group activity? This is an

important question given the widespread use of computers in preschool classrooms.

Sociometric Status

If different kinds of toys and environments change play behaviors, what about children of differing sociometric status? Asher (1978) suggests that peers influence the type of play in which children engage because youngsters spend so much time playing with one another. Peers set norms for appropriate behaviors and teach various skills. Thus, it is appropriate that we include sociometric status with our examination of preschool play.

For example, in 1983, Ladd studied the social status of forty-eight midwestern third and fourth graders. The sociometric assessments included: peer rating scales, a peer friendship questionnaire, teacher ratings, and a behavioral observation. The study found that socially isolated children tended to play with their peers in different ways. Rejected children spent more time than average or popular children engaged in onlooker, unoccupied behaviors, and small play groups, usually with younger or unpopular children.

Putallaz and Gottman (1981) indicate that sociometric tests are valuable descripters of social status within a specific group. They also point out that the behaviors of popular and unpopular children differ in terms of social

groups and positive/negative interactions.

Several specific play studies have incorporated the assessment of sociometric status. Rubin (1982) utilized a sociometric rating scale to identify those forms of play which correlated with social, social-cognitive, and cognitive assessments. Prosocial behaviors were found to be significantly related to positive peer ratings, while antisocial behaviors correlated with negative peer ratings.

Rubin and Daniels-Beirness (1983) also used a sociometric rating scale to study the relationships between negative and positive peer relations and various correlates: play behaviors, I.Q., and problem-solving skills. Their findings corroborate those of Rubin (1982).

In summary, the research on sociometric status suggests that the quality of interactions with peers differs between popular and unpopular children. Rejected children tend to spend less time engaging in prosocial interactions and more time in agonistic and unoccupied behaviors. Since children play differently with peers of different statuses, it is important to address the issue of sociometric status in any study of play.

Peabody Picture Vocabulary Test Assessment

Since social status affects play behaviors, what of cognitive status? Although the Peabody Picture Vocabulary Test (PPVT), Dunn and Dunn 1981, is not usually used as a measure of cognitive ability, several studies have reported that it can be used reliably for this purpose, eg. Ruopp, Travvers, Glantz and Coelen's National Day Care Study (1979), McBride (1984).

Rubin (1982) incorporated the PPVT, a measure of cognitive status, into a play study using the Parten/Smilansky play hierarchies. He found that lower PPVT scores were significantly related to onlooker behaviors and solitary functional play.

Rubin and Daniels-Beirness (1983) also used the PPVT in their study of young children's play. They found that children whose receptive language abilities were more advanced were also more popular with their peers. It appears that the addition of both social and cognitive assessment measures, such as sociometric status and the PPVT, serve to complement the observational data from the Parten/Smilansky scales, thus extending our understanding of the entire issue of play categories.

Summary

From the review of literature regarding social and cognitive play, some studies have been concerned with social play, while others have focussed on cognitive play. Since the mid-seventies, a large number of play studies have investigated both the social and cognitive elements of play. The nested use of these two play categories can provide more information about the type of play being observed. Recent studies have added cognitive and social assessments as a means of further elucidating the highly complex subject of children's play. The majority of the play studies utilizing the Parten/Smilansky scales have failed to specify the play materials used.

The areas of traditional preschool play have been studied, but computers are fast becoming a part of the preschool play environment and information regarding the preschool-computer interface is lacking. A need exists to investigate scientifically computer use from a social/cognitive perspective in order to provide in-depth information about what types of social/cognitive activities actually occur at the computer. Does the computer encourage or eliminate play? Does the computer in the classroom promote more solitary or social interactions? Do play behaviors change when using the computer?

This study proposes to compare traditional preschool play along with computer play by using the Parten/Smilansky scales and also incorporating social/cognitive measurements in the form of a sociometric rating scale and the PPVT. The delineation of "isolate" toys as opposed to "social" toys has also been taken into account in the selection of play materials to be used in his study.

Computers and Children

Computer Play

Banet (1978) predicts that the introduction of computers will be the factor that most dramatically changes teaching and learning by the end of the twentieth century. This prediction is as applicable to the preschool and elementary grades as it is to any other learners. Five years ago, the presence of computers in elementary schools was just beginning to be felt, while at the preschool level, they were virtually nonexistent. However, that is no longer the case. According to Hirschbuhl's table of projected acceptance and utilization of the computer in preschool settings, "in 1977, the acceptance was zero and the utilization was none, but by 1990, the acceptance will be widespread and utilization indicates heavy use" (Hirschbuhl, 1978, p. 62). This

reflects the availability of microcomputers, being introduced in 1977 and the dramatic rise in computer popularity up to the present.

Although computers are increasingly being introduced into preschool environments, little is known about how young children can most effectively utilize computers and what types of social and cognitive activities occur at the computer. In order to help educators deal efficiently with the introduction of computers into the preschool, a need exists for more information in this area. Are sex differences evident when young children use the computer? Do brighter or perhaps, socially-isolated children tend to use the computer more often than other preschoolers?

The existing literature regarding preschoolers and computers is general in nature, with specific scientific measurements virtually nonexistent. As Brady and Hill (1984) indicate, "When reviewing the current research relating to young children and computers, it becomes clear that there is much more rhetoric than solid evidence" (p. 50).

Vaidya's commentary (1983) on preschoolers using LOGO, an easy to use and high-level programming language, suggests that computers encourage play and imagery. This enables children to move into symbolism. The "toy" aspect of the computer is a link between fantasy and visual representation. The familiarity that children have with television is a carry-over to the computer, however the

passive nature of television-viewing sharply contrasts with the interactive nature of computer use. Although the number of subjects was not specified and no statistical documentation was given, the author did observe that preschoolers cooperated and shared ideas at the computer.

Swigger and Campbell's descriptive study (1981) of the experiences resulting from the introduction of computers into the North Texas State University Nursery School notes the toy aspect of computers which invite young children to play. Although the authors fail to document their methodology, they equate the interactive power of computers with the sort of learning process that occurs when a child learns to walk, talk, and play an instrument. Elaborations were made on the development of socialization, self-confidence, and the elimination of sex differences through computer use by young children. These studies (Swigger & Campbell, 1981; Vaidya, 1983) are representative of much of the research that has been done in the area of preschoolers and computers. Descriptive statements prevail with little in the way of scientific data to support the statements. Both studies did note the play aspect in young children's use of computers.

The Piestrup (1981) study of fifty three- and four-year-olds at the Stanford Bing Nursery School was an attempt to scientifically evaluate young children's exposure to computers. The study assessed a reading skills program and noted that cognitive gains were evident

from comparisons of pretest and post test data. Sex differences and increased socialization were observed in the use of computers, although no documentation was given for this. Females showed more persistence and interest in using the computer than males and the children rarely used the computer alone due to the large group that seemed to always cluster around the computer. In conclusion, the author notes the interactive nature of computer experiences and suggests that three and four-year-old children enjoy playing at the computer. This compares favorably with the findings of Vaidya (1983) and Swigger and Campbell (1983), thus suggesting that it is appropriate to analyze computer interaction as play.

Sex Differences in Computer Usage

Swigger, Campbell, and Swigger (1983) investigated sex differences regarding computer use. The participants were forty-four children, aged three to five years, attending North Texas State University Nursery School. The authors stated, "We were interested in sexual preferences because colleagues and previous studies indicate that school age children seem to label optional computer activities a boy's domain" (p. 39). Some differences were observed in the types of computer activities that were chosen. The girls tended to select more drill and practice type programs, while the boys preferred problem-solving programs. However, the authors

found that at the preschool level, there was no significant difference between the sexes in the amount of time spent at the computer.

This contrasts with the findings of Beeson and Williams (1983) in which thirty-two preschool children were observed during free choice time. The children, divided into two groups (those under five and those over five), had five options to choose from, one being the computer. Significant differences were found between boys and girls under five in their choice of the computer. Males chose the computer three times more frequently than females in the under five age group, which also contrasts with the findings of Piestrup (1981). However, this as as not the case with children over five years of age where no significant differences were found. The Beeson and Williams study focussed on sex and age in the computer use of young children and did not address the type of play exhibited at the computer, either socially or cognitively. No comparisons were made between computer play and the other four traditional options available in the classroom.

Social Interactions at the Computer

While opinions differ on gender-related preferences with the computer, the literature is replete with references to social interactions which occur at the computer center. This contrasts strongly with initial fears that computers promote asocial behaviors and foster

social isolates. A study of the impact of computers on social behaviors in the elementary grades (Hawkins, Sheingold, Gearhart & Berger, 1982) found significantly more social interaction when children used computers compared with other classroom activities. The other activities were not teacher-directed, but were tasks such as language, and map-making, where the children were encouraged to work with others. This study observed fifty-three children, aged eight to eleven, who were learning to program in LOGO. It examined the type and amount of collaboration both in computer and non-computer tasks where children were free to work alone or with others. The computer accounted for significantly more task-related interaction and collaboration, both verbally and action-based. A second part to this study did employ sociometric pre-tests and post-tests to determine whom the children would select as an "expert" to help them with different classroom tasks. No consensus on "experts" existed in the non-computer tasks, whereas, more than one-half of the children agreed upon "experts" in the computer tasks. Also, girls were rarely identified as computer "experts" which may coincide with opinions that computers are traditionally the male domain, as stated in Swigger, Campbell, and Swigger (1983) and Piestrup (1981).

Mind At Play (1983), the Loftus's book of the psychology of video games points out that the socializing and cognitive potential of computer games are unique. The

authors link video games as a sequential introduction to computerized learning. They suggest that distinctions between educational programs and video games is virtually nonexistent.

Reports from The Symposium on Video Games and Human Development held at the Harvard Graduate School (Mitchell, 1983) carried two major themes: socialization and cognitive development via computer games. Mitchell, studying the social process of family interaction with video games, indicated increased family cooperation and interaction. She studied twenty San Francisco families by means of observational and self-report records. The subjects felt that video games eliminated age and sex differences and encouraged more play between boys and girls. The study reaffirms the socializing aspects of video games.

Another Symposium speaker, Brooks, based his comments upon observational research done in video game arcades. He elaborated on the types of social interaction evident while playing video games. Even when the subjects were not actually playing, over 80% of them reported that they spent their time watching others play and visiting with friends. Brooks also felt that video games fostered socialization and stimulated self-confidence in socially-isolated children which ultimately contributed to their social development.

Cognitive Development
and the Computer

Most noteworthy of The Symposium on Video Games and Human Development (Mitchell, 1983) commentaries regarding cognitive development and computers were those of Greenfield. She notes the development of eye-hand coordination from the Piagetian perspective in that the sensorimotor gives way to concrete learning, which, in turn, is the basis for more formal operations. One advantage of computer games, from the cognitive perspective, is the visual transformation of information which develops inductive skills.

Papert's Mindstorms (1980) equates the future use of the computer to that of a pencil. He advocates a departure from traditional views of computer use as a teaching instrument to one in which the child teaches the computer, and in so doing, thinks about thinking. In Piagetian terms, the computer may be the means to move from concrete thinking to more formal thought as the child learns to manipulate symbols and thinks about his/her own thought processes.

Ziajka (1983) suggests that computers allow young children to generate graphics. This may provide youngsters with another means to participate in symbolic representation.

Computers provide stimulation and opportunities to

develop cognitive skills, according to McBride (1984). This study of thirty-five preschool children attending the Utah State University Child Development Lab compared computer affect and intellectual ability. Children with higher cognitive abilities used the computer more often and also had positive affect towards the computer. Despite the findings that computers do provide opportunities for cognitive and social development, controversy still exists as to the proper role for computers in the current preschool environment. As Burg (1984) states,

> Somehow computer play doesn't match the colorful conversations of dramatic play, the creative shapes of block play, or the mysterious touch of finger paint...or does it? Colorful conversations, creative shapes, and mysterious touch can come from computer play, but in ways that are new and strange. It will take open minds, more evaluation, and plenty of imagination. (p. 32)

Computers provide another way for children to learn, both socially and cognitively. Children learn through play. Computers can be a means to enhance rather than replace the traditional play environment in preschools. More scientific research is necessary in order to discover how children learn, both socially and cognitively from computer play. This research, undertaken with imagination and an open mind, is a step in that direction.

Summary of the Problem

Play is a sophisticated subject and one that is highly controversial, as has been stated. Both the social and cognitive perspectives of play are evident in the play literature and help to define the type of play. However, the play literature has not addressed the subject of computer play at the preschool level. In the computer-related literature, the social and cognitive themes are also notable, but it is lacking in empirical research. This study will investigate the social/cognitive levels of play at the computer in the preschool environment. The need for more research in the area of young children and the computer is consistently reaffirmed in the available research.

Young children learn through their play environment and the nature of objects in this environment influences their social-cognitive levels of play. With the increasing introduction of computers into the preschool classroom, certain issues need to be addressed in order to most effectively deal with the computer age. This research will explore the following questions:

1) Do gender differences exist in preschool play with the computer as measured by duration of play?

1) Do gender differences exist in preschool play with the computer as measured by social/cognitive

categories of play?

3) Do cognitive differences affect the use of the computer during play?

4) Does sociometric status affect the use of the computer during play?

5) Does free play with the computer differ from more traditional play from a social/cognitive perspective?

The investigation of these five questions should provide some helpful information about how young children use computers in play. It should also contribute to the literature on gender differences in preschool computer play. Finally, the comparison of traditional preschool play and computer play should provide information on the social and cognitive aspects of young children's play.

CHAPTER III
METHOD

Participants

Prior to the beginning of this study, a letter (See Appendix A) was sent to all parents explaining the nature of the study, requesting parental consent to participate, and offering to share the results with those interested. Only those children with signed parental consent forms were participants. They included forty-three children in two different preschool classes attending the Utah State University Children's House. The enrollment included twenty females and twenty-three males ranging from three to five years. The participants, with a mean age of 4.5 years, were the children of university students. Approximately twenty-five percent of them represented different cultural background, including Korean, South American, and Saudi Arabian. The sex ratio between boys and girls from different cultural backgrounds was exactly equal.

Each classroom employed a multidisciplinary approach to learning, which means that activities are planned in such a way as to meet a variety of developmental needs of the individual children. Both classrooms had an adult-child ratio of one to five, and used the same lesson

plans and classroom materials. The children attended either a morning or afternoon session three hours daily Monday through Friday.

Enrollment at the Children's House is handled on a quarterly basis with approximately five new students admitted per quarter to replace the five who have dropped out of the program. Occasionally, children will change sessions, moving from morning to afternoon or vice-versa in order to accommodate their parents' class schedules. This occurs at the beginning of the quarter and typically involves another five children. Thus, approximately ten children may be experiencing a new play environment or new peer groups at the beginning of any quarter.

Due to the transient nature of the enrollment, children are consistently meeting other children and dyadic relationships frequently occur on a rotating basis. The children accommodate easily to the new environment and different children. Specific play materials are also changed on a weekly basis in order to provide new challenges and activities for all the children, including those who have previously attended the school. However, for the duration of this study materials did not change. Therefore, prior acquaintance with children and materials should not influence this study due to the changing nature of both.

Four new children were admitted to the Children's House for Winter Quarter, 1985, and another four switched

sessions. Thirteen children had completed one quarter, eight had completed two quarters, and eighteen had attended four quarters.

Environment

The Children's House is located on the Utah State University campus and has four main rooms. During center time, the children are free to move about these rooms, choosing their own play activities. Center time occurs for one hour in the middle of each three hour session after the children are appropriately "warmed-up" for the day. A diagram of the rooms for center time is included in Appendix B. These room environments did not change across the study.

A mentioned in the literature review, the majority of the play studies using the Parten/Smilansky categories have failed to specify the play materials used. Rubin (1982) does suggest that small manipulative toys and art activities are most successfully used alone. Vandenberg (1981) found that the use of art materials produced solitary and parallel play, suggesting that art may be a less social activity. Quilitch and Risley (1973) designated art materials and small manipulative toys as "isolate" toys because they tend to produce individualized rather than group responses. Children often become more involved with the project rather than with the other

children, thus resulting in increased isolate behaviors. In terms of this study, art and manipulative toys were considered as more isolate-type activities, whereas blocks and dramatic play were designated as "social" play environments. Block play and dramatic areas tend to draw several children together. Usually, more social play evolves out of situations where several children are using the same type of equipment and interacting.

In this study, representative play centers were available in the classroom, accessible traditionally in most preschools. The first two centers, illustrative of more isolate activities, art and small manipulative toys, were balanced by the second two centers, illustrative of more social activities, a dramatic play area and blocks. The fifth center was the computer, not traditionally available in most preschools.

The art center included: paper, crayons, magic markers, paste, collage materials, paints, and colored chalk. The small manipulative toys included: puzzles, bristle blocks, Lego blocks, Lite Brite, magnets, and dominoes. The block center included: small and large wooden blocks, trucks, wooden people, and a free-form dollhouse. The dramatic center included: costumes, hats, mirrors, doctor's office equipment, and puppets. The computer center included two available programs: Ducks Ahoy! and Sea Horse Hide 'n Seek. Teachers were in close proximity (within three feet) of each center to assist

with problem situations. Children's play behaviors were coded every fifteen seconds as to: which center, which social type of play (solitary, parallel, group, onlooker, or unoccupied), and which cognitive type of play (functional, constructive, dramatic, or games with rules). This is described in the Procedures section (See Appendix C).

Computers have been a part of the Children's House curriculum since Spring Quarter 1984. The computers have been used in two ways as learning centers, both teacher-directed and self-selected. All of the children enrolled Fall Quarter, 1984, in the Children's House have used the computers for nearly three months, so the novelty associated with a totally new experience was limited. New students entering the preschool beginning Winter Quarter, 1985, were introduced to the computer by the head teacher ten minutes every other day for the five weeks prior to data collection. These children had time to use the computer on both an individual and group basis. Furthermore, they were encouraged to play at the computer during center-time. This was one to consistently lessen the novelty of the computer experience.

The two computers used were Commodore #64s with a single disk drive and Commodore color monitors #1701. There was a selection process regarding the choice of software for this study. Twelve programs were evaluated using both teacher and child input. The two programs

selected were the ones most often requested by the children and those with which they became most involved. The teachers chose the programs because they effectively combine the excitement of play with learning concepts such as size, color, and spatial relationships. Two child development specialists viewed the programs and suggested that they were appropriate for preschool-age children. Children from three to five years of age were able to use these programs in a variety of different ways, as reflected in the results of the pilot study (See Appendix D).

The software used in this study were Ducks Ahoy! and Sea Horse Hide 'n Seek produced by CBS Software. Both programs were created by Joyce Hakansson Associated, a team of programmers, educators, artists, game specialists, writers, and musicians. They were deemed appropriate for this study because they were popular with the children, and effectively combined preschool play with learning concepts.

In order to ensure equal access to all the centers, certain school rules were developed and were in effect. Children were free to engage in any of the available play centers on a first come, first served basis, as long as there was room at the center. If a center was fully occupied, children told the teacher in attendance that they wished to participate. The teacher recorded these names on a list and called each individual when there was

room. The typical amount of time a child usually needed to wait was five minutes. When a child was called to a center, s/he was free to accept or decline the given situation. This was consistent across the course of the study. At the computer center, a child had unlimited use of the equipment until someone else requested a turn. At that time, the name of the child requesting a turn was put on a list and the child currently using the computer had five more minutes, after which they added their names to the bottom of the list or chose another center.

Instruments

Peabody Picture Vocabulary Test

The Peabody Picture Vocabulary Test (PPVT) was administered to all the children as a means of assessing cognitive abilities for descriptive purposes. Parents were questioned as to the primary language spoken in the home. Those children speaking English as a second language were administered the PPVT in their native tongue. The specifics of this are discussed in the Procedures section.

Some disagreements exist regarding the reliability of the PPVT. For example, Johnson (1979) reviewed the PPVT literature and found that reliabilities ranged from r=.67 to .84. On the other hand, Ruopp et al. (1979) indicated the PPVT reliability as .90 when used for assessing school

readiness. Recent play studies utilizing the Parten/Smilansky play hierarchies (Rubin, 1982; Rubin & Daniels-Beirness, 1983) have also used the PPVT as a means of computing mental age.

Evaluation of Sociometric Status and Social Participation

Prior to data collection, each child had their photograph taken wearing identical Children's House tee shirts. A sociometric evaluation consisting of four parts was administered to all subjects as a means of assessing social standing within the peer group. The first part included each child viewing the photographs and naming each child. The photos were arranged in rotating alphabetical order and the children were assessed in alphabetical order to provide for randomization. The specifics of this is discussed in greater detail in the Procedures section. The children were then asked to answer six questions - See Appendix H. The instrument is an adaptation of the Peery Scale (1979). The following questions are included: (1) Whom do you like to play with outside? (2) Whom don't you play with outside? (3) Whom do you like to sit next to in group time? (4) Whom don't you sit next to in group time? (5) When you can do anything you want to, with whom do you do it? (6) When you can do anything you want to, with whom don't you do it? Each child received three peer acceptance scores.

These were obtained by subtracting the number of times a child was named on each odd-numbered item from the number of times a child was named on each even-numbered item, thus pairing items one and two, three and four, five and six. Each child also received three social impact scores. These were obtained by summing the number of times a child was mentioned on even-numbered and odd-numbered items for each of the pairs.

The second part of the sociometric evaluation took place the following day. This consisted of a rating task to establish reliability. The photographs were presented in the order described above. The child was asked to match each picture with a happy or sad face which was verbally linked with "children you like to play with a lot" and "children you don't like to play with." The happy and sad faces corresponded with ratings (positive = 2 and negative = 1). Each child received three scores, a total positive score, a total negative score, and a positive or negative score for a visibility measure (total positive minus total negative).

The third part of the sociometric evaluation consisted of teacher ratings as they perceived each child's peer acceptance or rejection. Each child was rated in one of the following categories: (1) positively accepted, (2) negatively accepted, (3) combination of positive and negative, and (4) neutral. See Appendix J for the rating instrument.

The final part of the sociometric assessment included a behavioral observation of actual social contact in the classroom. Each child was observed for five minutes on two days during free play in order to assess social participation. The following categories of behavior were coded: (a) direction of contact (including child or adult); (b) child's role (including initiation or responses); (c) predominant type of contact (including verbal, nonverbal, or both); (d) quality of contact (including positive, negative or neutral). The scores for each category were computed by adding the total number of frequencies for each behavior. See Appendix I for the rating sheet.

Parten/Smilansky Social Cognitive Play Hierarchies

The measurement format nests Smilansky's (1968) cognitive play categories within the social play categories of Parten (1932). The precedent for using the Parten/Smilansky scales in studies of children's play has been set (Rubin et al., 1976; Rubin, Watson & Jambor,, 1978; Johnson et al., 1980; Johnson & Ershler, 1981; Rubin, 1982; Rubin & Daniels-Beirness, 1983).

Smilansky's categories code the cognitive levels of play behaviors and are defined as:

> (a) functional play - simple muscular activities....he repeats his actions and manipulations, imitates himself, tries new actions, imitates them, repeats them; (b)

constructive play - he learns the various uses of play materials...activity that results in a "creation"; (c) dramatic play - he can freely display, in a variety of ways his physical prowess, his creative ability, and his budding social awareness; and (d) games with rules - the child has to accept prearranged rules and adjust to them (Smilansky, 1968, pp. 5-6).

Parten's Social Participation Measure (1932) codes the degree of socialization in play behaviors of preschoolers during play. Category definitions include:

> (a) unoccupied behavior - the child apparently is not playing, but occupies himself with watching anything that happens to be of momentary interest...(b) onlooker - the child spends most of his time watching the other children play. He often talks to the children whom he is observing..., but does not overtly enter into play by himself...(c) solitary independent play - the child plays alone independently with toys that are different from those used by the children within speaking distance and makes no effort to get close to other children...(d) parallel activity - the child plays independently, but the activity he chooses naturally brings him among other children...(e) associative play - group play in which there is an overt recognition by the group members of their common activity in which appears the elements of division of labor, group censorship, subordination of individual desires to that of the group. (Parten, 1932, p. 250)

Rater disagreement between the associative and cooperative play categories has led to the collapse of the two categories to form one group play category (Rubin et al., 1978; Johnson et al., 1980; Johnson & Ershler, 1981), which also was incorporated into this study. Walker (1973) indicates the instrument validity scores for the Parten scales to be .88 for the combined ratings of the five teachers. As far as instrument reliability, the correlation of scores ranged from .76 to .90 (Parten,

1932).

The application of the Parten/Smilansky play categories to computer play has not been undertaken to this author's knowledge, therefore it is necessary to give some specifics pertinent to this study. The social categories, solitary, parallel, and group play, applied to computer use remain exactly as stated and further elaboration would be redundant. However, the cognitive categories or computer play in this study were defined from a pilot study as: (a) functional - simple, repetitive movements with the keyboard, joystick, buttons or without objects; (b) constructive - moving the object of play (sea horse or duck) constructively along correct paths, purposeful movements; (c) dramatic - verbal interaction with the monitor, yelling, cheering, clapping, possible physical involvement with the screen, for example, the child tries to hide or divert the hippo in Ducks Ahoy! by placing their hands on the monitor; (d) games with rules - playing by the complete rules of the games, including all the nuances unique to the particular game. For Ducks Ahoy! the specific rules include: (1) moving boat to appropriate spots on the screen and subsequent loading of ducks into the boat; (2) evading the hippos; (3) moving boat to the unloading dock at the beach; (4) eject duck by pressing the red button; (5) move boat and return to play. For Sea Horse Hide 'n Seek, the specific rules include: (1) moving the seahorse in the appropriate direction; (2)

use camouflage techniques; (3) evade the path of the big fish; (4) project the seahorse into the safety of the ship's hull.

These computer categories were pilot tested along with the other play area categories on eight children, four boys and four girls ranging in age from 3.4 years to 5.3 years with a mean age of 4.6 years. These children were not subjects in this study, but had been exposed to computers the prior quarter. The pilot study was done to establish the appropriateness of the play categories. The first part of the pilot study concentrated only upon computer play and the observations indicated that solitary and parallel computer play occurred much more frequently than group computer play (See Appendix E). Within the solitary play category, constructive play followed by functional occurred most often. In the parallel play category, the instances of functional and dramatic play took place most frequently. The group play category did not reveal any instances of functional or constructive play, but games with rules and dramatic play did occur at a non-significant level. The play categories did seem appropriate when related to the computer.

Regarding the other play centers, group play occurred most frequently in the blocks and small motor centers, followed closely by parallel constructive play. Parallel constructive behavior overwhelmingly dominated the art center, while the dramatic center observations revealed

solitary functional play followed by parallel dramatic most often. This data is summarized in Appendix F. The dramatic computer play category provided the greatest variety of unexpected responses from the subjects. The original coding description included verbal interaction with the monitor. However, due to depth of involvement and fantasizing that was observed in the pilot study, it was necessary to add the following behavioral descripters: yelling, cheering, clapping, and physical involvement with the screen.

Another need that was discovered through the pilot test was the addition of a transition category to handle cases where a child is moving from one play center to another. A transition category was added to this study. The precedent was set in the recent play studies of Rubin (1982) and Rubin and Daniels-Beirness (1983). These two studies also utilized three other categories: rough and tumble, reading or being read to, and active conversations with teachers and peers. Although these behaviors were not observed in the pilot study, they could occur. It appears that these categories might be a valuable addition to the research and therefore were incorporated into this study. Refer to Appendix G for tables showing the original instrument, the traditional instrument, and the expanded instrument.

Procedure

Peabody Picture Vocabulary Test

The researcher and the translators were trained prior to the formal testing situation in order to ensure reliability. One female research, a teacher at The Children's House, administered the Peabody Picture Vocabulary Test in English. The Spanish and Portuguese translators for the English as a second language children were bilingual housewives. The Korean and Arabic translators were bilingual students referred by the ESL Department. These translators, one male and three females, spent one hour during free play with the children prior to testing to establish familiarity.

The primary researcher handled the testing of thirty-one children. This research observed the testing of the twelve English as a second language children to ensure similar testing conditions and recorded the answers. The testing was carried out exactly as the English testing with the exception that the words were spoken in each child's native tongue.

The testing conditions were the same for all subjects. Each child was approached by the researcher who said, "Child's Name, we are going to play a game in another room. Please come with me." The child was led to an empty office, approximately eight feet by ten, where

the noise and distraction level were minimal. After the test, the children were praised, thanked for their hard work, and returned to the classroom.

Evaluation of Sociometric Status and Social Participation

A sociometric rating task was administered to all subjects by a female early childhood education major. Prior to the assessment, the researcher spent time with the children during free play to establish familiarity. The testing took place over two days. The testing procedure for all the children was the same. The researcher approached a child and said, "Child's Name, please come with me. We are going to play a game." The child and research went to the same room where the PPVT was previously administered. The first day, the researcher showed each child the photographs of all the other children. The photos were arranged in rotated alphabetical order to provide for randomization. The researcher asked the child to name all the children and then asked the six questions from the Peery Scale (1979). See Appendix H.

On the second day, similar procedures were followed though the identification of the photographs. At this point, the researcher showed the children pictures of two faces: happy and sad. The child was asked to point to the picture which is the face that shows when they like

playing with someone, when they don't like playing with someone. This was done to ensure that the children had similar conceptualizations of the two categories, happy and sad. The researcher then presented one peer photograph at a time in the order described above. The child was asked to put it near the happy or sad face.

Regarding the evaluation of social participation, two female researchers computed the observations to assess social contacts in the room. The two raters were trained prior to data collection, did pilot testing on ten children at a different preschool to establish reliability of 95%, and also did midway and post reliability checks. They sat unobtrusively in the classroom adjacent to the play area of the children and coded the behavior for each child. Each rater observed a child for a five minute period each day for two days. This code sheet appears in Appendix I.

The two head teachers at The Children's House also independently rated each child on social status. The instrument is in Appendix J.

Parten/Smilansky Play Scales

The data utilizing the Parten/Smilansky play scales was gathered over a two-week period. Each child was observed in free play during three ten minute segments carried out over three different days. The names of the subjects to be observed on a particular day were taken

from a randomized list of subjects to insure impartial observations.

Two raters (female Caucasians) were trained prior to data collection by means of a formal training session. Both raters, blind to the purpose of the study, then simultaneously gathered eight ten-minute time samples to establish inter-rater reliability on children at a different preschool. Percentages of agreements exceeded 88% in each case. Inter-rater reliability was assessed at the midpoint and the end of the study. Agreements exceeded 90%. After establishing reliability, the two raters simultaneously coded the play behaviors of the participant every fifteen seconds using a code sheet (see Appendix C). The code sheets had been previously piloted. The raters were cued by tape recorders that emitted an audible beep in the observer's ear only. The tape recorders were checked periodically as to the accuracy of the timing device. The observers positioned themselves as unobtrusively as possible and in such a way as to prevent them from seeing each other's data sheet. The classroom situation proceeded normally. Since there were typically five adults and visitors in the classroom, the raters were not obtrusive.

CHAPTER IV

RESULTS

The data were analyzed in a variety of ways to provide a more complete understanding of the relationships among the variables. The data analysis included: descriptive statistics, analysis of variance, correlations (Pearson's r), and multiple regression analysis. Significance levels were set at .05 or above. The framework for the discussion of the data analysis will be based on the five questions to be addressed in terms of this research.

Question I

Do gender differences exist in preschool play with the computer as measured by duration of play?

Both descriptive statistics and analysis of variance (total computer time x sex) indicated no significant differences between the sexes in the amount of time spent at the computer $F(1,42)=.0191, p \leq .891$; males, $\bar{x}=445.43$, females, $\bar{x}=420.75$.

Question II

Do gender differences exist in preschool play with the computer as measured by social/cognitive categories of play?

A gender (2) x social (3) x cognitive (4) ANOVA for computer play was performed. No significant differences were found between the sexes in terms of social, cognitive, and nested social/cognitive computer play.

Question III

Do cognitive differences affect the use of the computer?

The Peabody Picture Vocabulary Test, a measure of receptive language ability, was used as a means of assessing cognitive abilities for descriptive purposes. A grouped t-test on standardized PPVT scores was performed on Group I, English-speaking children ($\bar{x}$=102.16) and Group II, English as a second language children ($\bar{x}$=103.90). This yielded no significant differences, t=-0.43.41df,p$\leq$.669. A second grouped t-test was completed on Group III, children born in the United States ($\bar{x}$=101.73), and Group IV children born in other locations, including English spoken as first and second languages ($\bar{x}$=101.41). Again, no significant differences were found

$t=.90,41df,p \leq .371$. The PPVT scores were pooled to form one group since no significant differences were found.

Descriptive statistics and PPVT scores x sex (2) ANOVA indicated no significant differences between the sexes (males, $\bar{x}=102.65$, females, $\bar{x}=106.45$), $F(1,42)=.99842,1,p \leq .324$. The mean for all PPVT scores was 104.419 with a standard deviation of 12.431.

Pearson's r was run using PPVT scores with all social and cognitive categories of computer play, plus total computer time. No significant relationships were found.

A multiple regression analysis was done using PPVT scores as the independent variable. The dependent variables included the three social categories (solitary, parallel, and group), the four cognitive categories (functional, constructive, dramatic, and games with rules) and the total computer time. Again, no significant differences were found between the cognitive abilities as assessed by the PPVT and the use of the computer.

A two-way interaction, PPVT scores x sex (2) ANOVA, resulted in significant differences for females and computer use, but not for males. Females' PPVT scores were grouped: Group I, those above the mean ($\bar{x}=106.45$) and Group II, those below the mean ($\bar{x}=106.45$). The range for Group I females was 108 to 139. The range for Group II females was 78 to 104. Significant differences at the .005 level were noted regarding total computer time. Females in Group I ($\bar{x}=750.00$) used the computer

significantly more often than those in Group II ($\bar{x}$=152.09). Also Group I ($\bar{x}$=.2730) engaged in group computer play significantly more often than Group II, ($\bar{x}$=.0080).

Question IV

Does sociometric status affect the use of the computer during play?

Pearson's r indicated a significant relationship between positive quality of social interaction and constructive level of cognitive play at the computer ($r=.3320, p \leq .030$). Further, significant relationships were found between the amount of dramatic play at the computer and the following sociometric status variables: children who used both verbal and nonverbal interactive modes with others ($r=.3111, p \leq .042$), children whose interactions had a predominantly negative quality to them ($r=.3898, p \leq .010$), and children whose interactions had both negative and positive qualities ($r=.4113, p \leq .007$). All other correlations were nonsignificant.

Question V

Does freeplay with the computer differ from more traditional preschool play from a social/cognitive perspective?

Analysis of variance between the five centers and the percentage of total play time spent at each: Solitary (4) x Parallel (4) x Group (4) x Onlooker (1) x Unoccupied (1) ANOVA yielded significant differences $F(4,3009)=4.5615 p \leq .0011$). Multiple range tests denoted significant differences at .050 between the computer center ($\bar{x}=.6213$) and the following two centers: manipulative toy center ($\bar{x}=1.3405$), and the dramatic center ($\bar{x}=1.0598$). Homogeneous centers with no significant differences included the computer center ($\bar{x}=.6213$), the art center ($\bar{x}=.5565$), and the blocks center ($\bar{x}=.8787$).

Analysis of variance between the five social categories (solitary, parallel, group, onlooker, and unoccupied) and the percentage of total play time: Social (5) x Cognitive (4) x Center (5) ANOVA indicated significant differences $F(4,3009)=26.9078, p \leq 0.0001$). Multiple range tests noted significant differences at .050 between group play ($\bar{x}=1.9360$) and all the other social categories: solitary ($\bar{x}=.6372$), parallel ($\bar{x}=.5407$), onlooker ($\bar{x}=.0233$), and unoccupied ($\bar{x}=.0001$).

Analysis of variance between the four cognitive

categories (functional, constructive, dramatic, and games with rules) and the percentage of total play time: Cognitive (4) x Social (3) x Center (5) ANOVA denoted significant differences $F(3,2579)=.34.7327, p\leq.0001)$. Multiple range tests indicated significant differences at .050 between constructive play ($\bar{x}=2.2171$) and all the other cognitive categories: function ($\bar{x}=.2744$), dramatic ($\bar{x}=1.2853$), and games with rules (.3752).

Analysis of variance between the five centers/social categories and the percentage of total play time: Centers (5) x Social (3) ANOVA showed significant differences $F(14,2407)=7.5307, p\leq.0001)$. Multiple range tests noted significant differences at .005 between computer/group play ($\bar{x}=1.2209$) and computer/parallel play ($\bar{x}=.2035$). Other significant differences at .005 were indicated between computer/group play ($\bar{x}=1.2209$) and the following: blocks/solitary ($\bar{x}=.2384$), dramatic/solitary ($\bar{x}=.3663$), and art/parallel (.3605).

Analysis of variance between the five centers/cognitive categories and the percentage of total play time: Centers (5) x Cognitive (4) ANOVA noted significant differences $F(19,2560)=19.5188, p\leq.001)$. Multiple range tests showed significant differences at .005 between computer/games with rules ($\bar{x}=1.7984$) and all the other four centers/games with rules: art ($\bar{x}=.0001$), manipulative toys ($\bar{x}=.0388$), blocks ($\bar{x}=.0233$), and dramatic ($\bar{x}=.0155$). Within the computer center itself,

significant differences at .005 were found between computer/games with rules ($\bar{x}$=1.7984) and the other three cognitive categories: computer/functional ($\bar{x}$=.4884), computer/constructive, blocks/constructive, and blocks/dramatic. This means that the cognitive types of play at these centers were similar in duration of play. Significant differences did exist at .005 between computer center/games with rules ($\bar{x}$=1.7984) and manipulative toys center/constructive ($\bar{x}$=5.1395) and dramatic center/dramatic ($\bar{x}$=4.1085).

Based on the total amount of play time observed, the computer center had the highest percentage 39.5% (n=17) of children who did not play at this center. This means that 17 out of 43 children did not engage in any computer play. The percentages of children who did not play at the other centers were: dramatic center 34.9% (n=15), art center 30.2% (n=13), block center 20.9% (n=9), and manipulative toys 9.3% (n=4). A Chi Square variance test for homogeneity of the binomial distribution notes significant differences (4df, x=12.6553, tabular value=9.49).

In terms of the mean amount of time spent in each center, manipulative toys was the highest ($\bar{x}$=1.3405), followed by the dramatic center ($\bar{x}$=1.0598), the block center ($\bar{x}$=.8787), the computer center ($\bar{x}$=.6213), and the art center ($\bar{x}$=.5565). However, the standard deviations were also the highest in the dramatic center 13.3721 and in the manipulative toys center 9.2159, suggesting that

certain children tended to play much longer in these two centers. No significant differences were found regarding the time spent at each center and sex or PPVT scores.

Additional Findings

In terms of total time spent at the computer including all children, Pearson's r noted three significant relationships (all $p \leq .6436$), parallel ($r=.6728$), group ($r=.8032$) and total computer time. Furthermore, total computer time was significantly related to three cognitive categories of play: functional ($r=.4419, p \leq .003$), constructive ($r=.5633, p \leq .0001$), and games with rules ($r=.8845, p \leq .0001$). The fourth cognitive category, dramatic, was not significantly related ($r=.2676, p \leq .083$) to total computer time.

These correlations suggest that the social/cognitive categories utilized in this play study, with the exception of dramatic, are representative of preschool computer play engaged in by both males and females.

CHAPTER V

DISCUSSION

Sex differences in the use of the computer at the preschool level is a controversial area. Beeson and Williams (1983) found that males chose the computer significantly more often than females, while Piestrup (1981) notes that females were more interested in the computer than males. This study showed no significant differences in the duration of computer play based on gender. These findings are similar to those of Swigger, Campbell, and Swigger (1983).

In this study, similar numbers of girls and boys did not engage in any computer play - 40% girls and 39.1% of the boys. This was not due to limited access to the computer. All children had equal opportunities to use the computer based on the sign-up sheet as discussed in the Procedures section.

While no significant differences were found in the duration of computer play based on gender, neither were any found in the type of computer play based on gender. These findings are consistent with those of Parten (1932), Smilansky (1968), and Barnes (1971) in which no sex differences were found in play, although computer play was

not addressed.

In this study, computer play was observed in social categories, cognitive categories, and nested social/cognitive categories. The findings of significant relationships between total computer time and all three levels of social play (solitary, parallel, and group) suggests that the computer may not be an isolate type of activity, as some have feared. It does not appear that we are destroying children's play by the introduction of computers into the preschool. Their computer play is similar to traditional types of play. Furthermore, the use of social/cognitive play categories is also appropriate to computer play.

This study did not find any significant differences between sexes regarding computer use and cognitive abilities as assessed by the PPVT. While children may engage in different cognitive levels of play at the computer, it appears that the computer is equally inviting to girls and boys of differing cognitive abilities.

However, two significant differences were found among the females, based on the two-way interaction of sex/PPVT scores with computer use. Girls with higher PPVT scores spent considerably more total time at the computer than those with lower PPVT scores. This correlates with the experimental segment of McBride's study (1984), which found that girls spent above average time at the computer and also had higher PPVT scores.

The second significant difference was that girls with higher PPVT scores engaged in considerably more group play at the computer than those with lower PPVT scores. This is interesting because Rubin and Daniels-Beirness (1983) suggest that children who are more popular with their peers also have higher receptive language abilities. For the cognitively mature girls, the computer may provide an opportunity for complex social exchanges. Computer play can be a source of social interaction at the group level.

Sociometric status appears to affect computer use. A significant relationship was found between positive social interactions and the constructive level of cognitive computer play. Children who exhibit prosocial behaviors also use the computer in a positive manner and on a cognitive level which significantly predominated in this study.

Dramatic play was a cognitive type of play significantly related to computer use in this study, when linked with the following sociometric variables: children who engaged in predominantly negative social interaction, children whose predominant interactions with each other were both verbal and nonverbal, and children who engaged in combinations of both negative and positive social interactions. It may be that the children who tend to interact dramatically with the computer in terms of shouting, yelling, cheering, etc., are also children who do not have highly developed social interaction skills.

They tend to treat their peers either negatively, both negatively and positively combined, and also exhibit combinations of both verbal and nonverbal behaviors. These children, lacking in sophisticated social skills, may interact in the same manner with peers and the computer. Observations of preschool computer behavior, in combination with other assessments, might possibly serve as tools for designating socially at-risk children in the future.

In terms of the total amount of play time observed, significant differences were noted between the computer center and the two most popular centers, manipulative toys and the dramatic center. However, the latter two also showed the highest standard deviations, suggesting that a few children spent large amounts of time engaged in those centers. In terms of time, the computer center was not statistically different from the blocks and art centers. This indicates that the computer is an appropriate preschool play center and the use of social/cognitive play categories are also appropriate.

Observations of all centers from a social perspective resulted in group play being significantly different from all the other social play categories. More children engaged in group play than any other social type. Regarding the computer categories alone, solitary and group play were similar, but parallel computer play was statistically different based on time. Also, the

cognitive levels of solitary and group computer play were significantly higher than parallel computer play. This correlates with the suggestions of Rubin, Maioni and Hornung (1976), and Johnson et al. (1980) that parallel play may be less cognitively mature than solitary play. Comparing the five centers, group play at the manipulative toys center and the dramatic center were significantly different from the computer center in the amount of time. However, group play at the computer center, art center, and block center were comparable. This was similar to the findings for total times for all centers. Preschoolers do indeed use the computer as a social activity, comparable to other traditional play activities. Computers in the classroom do encourage social interaction, as suggested by Hawkins, Sheingold, Gearhart and Berger (1982), Brooks (1983), Mitchell (1983), Piestrup (1981), Swigger and Campbell (1981), and Vaidya (1983).

Observations of all centers from a cognitive perspective resulted in constructive play being significantly different from all other cognitive play categories. More children engaged in constructive play than any other cognitive type, which is consistent with Rubin (1982), Rubin, Maioni and Hornung (1976), and Rubin, Watson, and Jambor (1978). Some interesting trends occurred in each center, lending construct validity to the study. Constructive play was most evident in the art center, manipulative toys center, and the blocks center.

Dramatic play was most apparent in the dramatic center, while games with rules play was most significant in the computer center. At the computer center, games with rules was the most frequently occurring cognitive level of play in all three social categories. Furthermore, solitary and group computer/games with rules play were significantly higher than all the other social/centers. This suggests that perhaps computers do produce a more advanced cognitive type of play, both individually and in group situations. Computers do provide another way for children to learn, both socially and cognitively.

Implications for Future Research

The very complex nature of this study lends itself to various issues which would provide more information regarding the use of preschoolers and computers. Further research is needed in the following areas:

1. Replication of this study using larger numbers of children and different preschool settings would certainly aid in enriching the findings of this study.

2. A study should be undertaken to determine why certain children choose to not engage in computer play in free-choice situations.

3. Future studies should address gender differences in terms of the types of computer programs chosen. This information could be further enhanced by the addition of

cognitive and sociometric status assessments.

In summary, computers can be used in preschool play settings. Computers serve to complement, rather than replace traditional learning. Computer play at the preschool level can be a socializing experience. Children of differing sociometric status tend to use computers in different ways. Also, computers appear to provide a higher cognitive level of play for young children than more traditional play materials. It will take imagination, open minds, and further study to determine the most effective use of computers in the preschool environment.

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APPENDICES

Appendix A

Letter to Parents

Dear Parent,

I am seeking your consent for your child's participation in a study of children's play to be conducted at the USU Children's House under the supervision of Professor Ann Austin of the Department of Family and Human Development.

This research will compare traditional preschool play with play at the computer. We are interested in finding out more about the types of social interaction that occur when preschoolers use the computer.

Children in this study will be assessed in four ways. First, the Peabody Picture Vocabulary Test will be used to assess the children's verbal abilities. This picture test lasts approximately seven minutes. Second, a sociometric rating task will be administered to each child as a means of assessing children's friendship patterns. This short task is similar to a game and the childen are asked "With whom do you play with a lot? With whom do you play with a little bit?,"etc. Third, to assess children's actual social contacts in the classroom, each child will be observed while playing for a five minute period each day for two days. Finally, in order to assess what type of play occurs in the classroom (at the computer and also

with other materials), each child will be observed in free play during three ten minute segments carried out over three different days.

This study is designed to be an enjoyable experience and your child will probably not even be aware s/he is being assessed. There are no foreseeable risks involved. However, you are free to withdraw from the study at any time for any reasons. Participants in the study may have access to the data at all times. If they request, they may receive a copy of the final results.

Sincerely,

Ann M. B. Austin, Ph.D Jeanne M. Hoover

CONSENT FORM

I/we have read the above and agree to allow my/our child to participate in this study.

Parent's Name Date

Child's Name

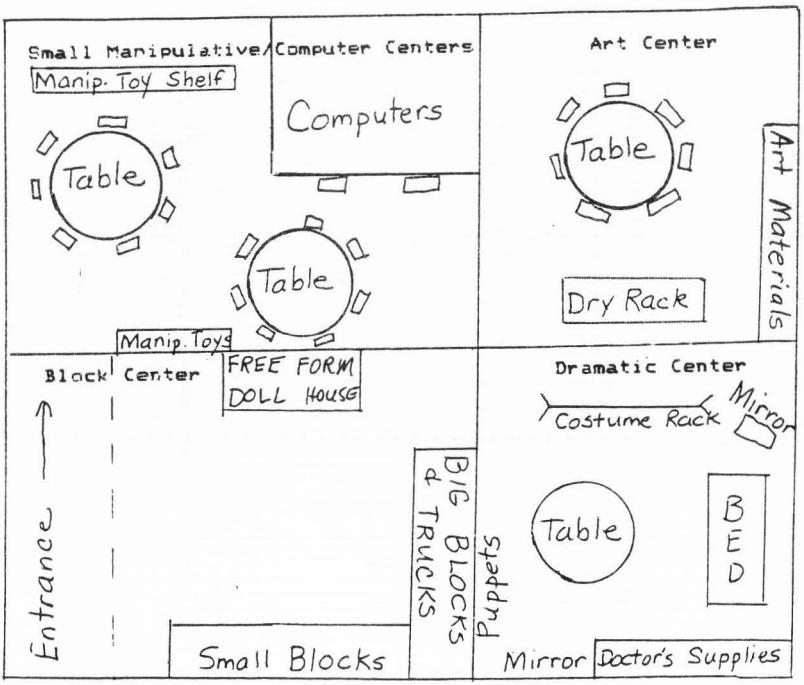
I request a copy of the final results of this study to be sent to:

Address

City/State

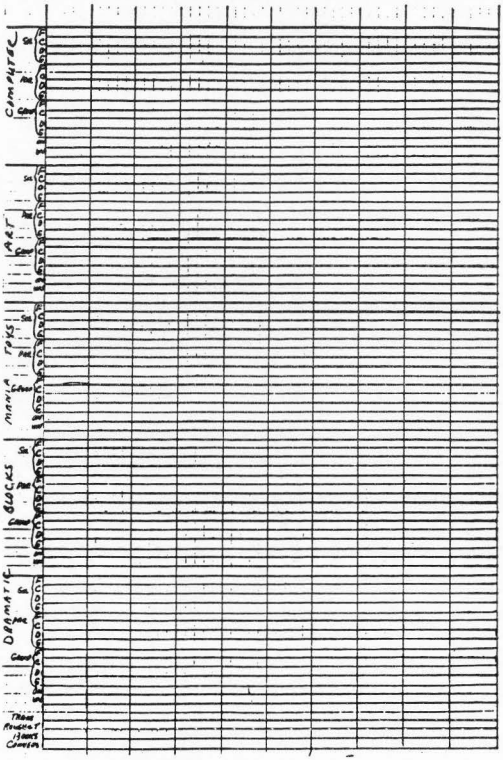
Appendix B

Children's House Room Environments



Appendix C

Play Observation Data Collection Instrument



Explanation

Social Categories:

sol = solitary play
par = parallel play
group = group play
on = onlooker
un = unoccupied

Cognitive Categories:

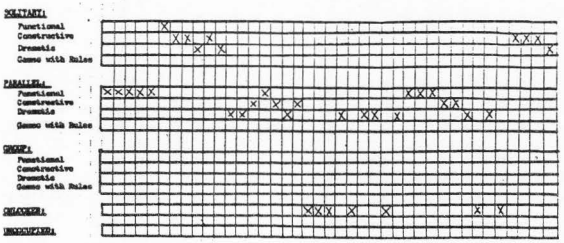
F = functional
C = constructive
D = dramatic
G = games with rules

Appendix D

Pilot Study

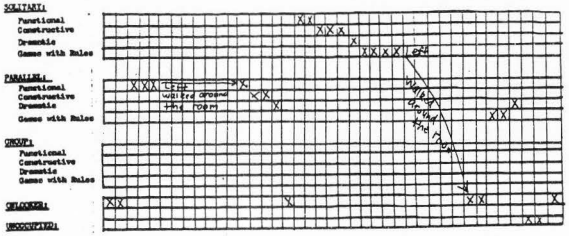
(Computer Center)

CHILD B.P(female) AGE 4



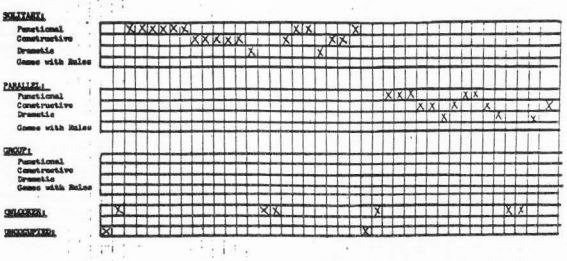
Observations every 15 seconds; Total 40

CHILD Z.S(male) AGE 4



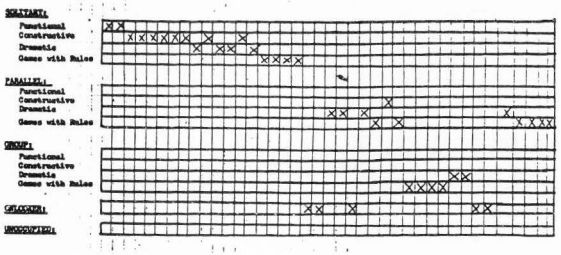
Observations every 15 seconds; Total 40

CHILD L.P. (Female) AGE 3



Observations every 15 seconds; Total 40

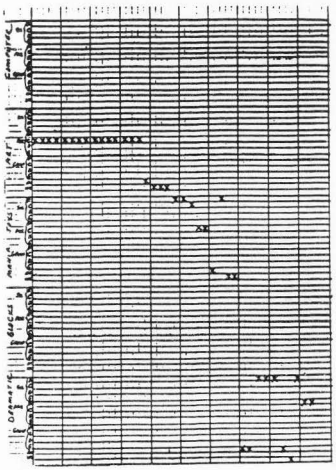
CHILD J.P. (male) AGE 5



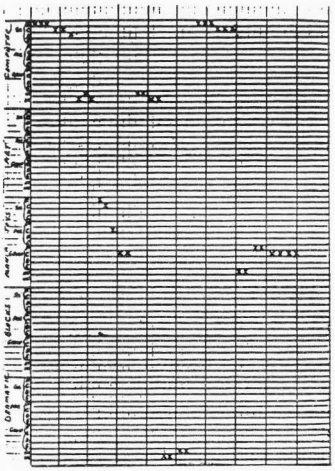
Observations every 15 seconds; Total 40

(All Centers)

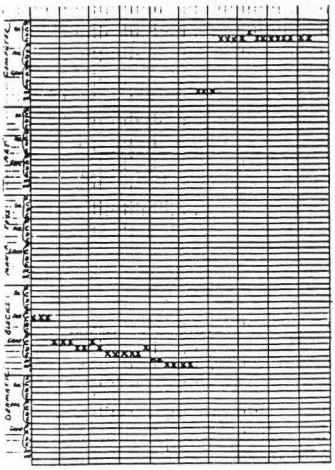
Female, age 4
Observation every 15 seconds



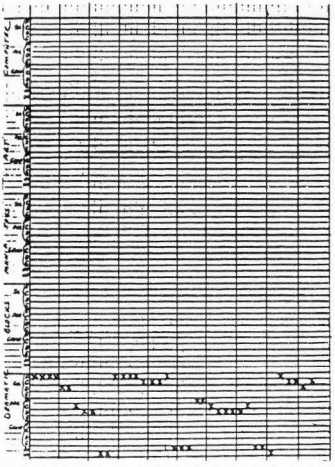
Male, age 4
Observation every 15 seconds



Male, age 5
Observation every 15 seconds



Female, age 3
Observation every 15 seconds



Appendix E

Coded Results from Pilot Study-Computer Center

		3yrs.	4yrs.	5yrs.	Male	Female
Solitary						
14	F	9	3	2	4	10
24	C	8	8	8	10	14
10	D	2	4	4	5	5
8	G	0	4	4	4	0
Totals Solitary		19	19	18	23	29
Grand Total Solitary 56						
Parallel						
19	F	5	13	1	5	14
15	C	5	7	3	5	10
17	D	3	11	3	5	12
6	G	0	2	4	6	
Totals Parallel		13	33	11	21	36
Grand Total Parallel 57						
Group						
0	F	0	0	0	0	0
0	P	0	0	0	0	0
2	D	0	0	2	2	0
4	G	0	0	4	4	0
Totals Group		0	0	6	4	0
Grand Total Group 6						
Onlooker		6	13	5	11	13
Grand Total Onlooker 24						
Unoccupied		2	2	0	2	2
Grand Total Unoccupied 4						

Appendix F

Coded Results from Pilot Study

(Art Center)

		3yrs.	4yrs.	5yrs.	Male	Female
Solitary 2	F	0	2	0	2	0
Grand Total Solitary 2						
Parallel	C	0	15	0	0	15
Grand Total Parallel 15						
Grand Total Group 0						
Onlooker		0	1	0	0	1
Grand Total Onlooker 1						
Unoccupied		0	3	0	0	3
Grand Total Unoccupied 3						

(Small Manipulative Center)

		3yrs.	4yrs	5yrs.	Male	Female
Solitary	F	0	3	0	1	2
	C	0	2	0	1	1
Total Solitary 5						
Parallel	F	0	1	0	0	1
	C	0	5	0	3	2
Totals Parallel		0	6	0	3	3
Grand Total Parallel 6						
Grand Total Group 0						

Onlooker		0	1	0	0	1
Grand Total Onlooker 1						
Unoccupied		0	4	0	2	2
Grand Total Unoccupied 4						

(Blocks Center)

		3yrs.	4yrs.	5yrs.	Male	Female
Grand Total Solitary 0						
Parallel	C	0	0	4	4	0
Grand Total Parallel 3						
Group	C	0	0	4	4	0
	D	0	0	5	5	0
	G	0	0	5	5	0
Totals Group		0	0	13	13	0
Grand Total Group 13						
Onlooker		0	0	2	2	0
Grand Total Onlooker 2						
Unoccupied		0	0	4	4	0
Grand Total Unoccupied 4						

(Dramatic Center)

		3yrs.	4yrs.	5yrs.	Male	Female
Solitary	F	2	4	0	0	6
	C	3	0	0	0	3
	D	6	0	0	0	6
Totals Solitary		19	4	0	0	23
Grand Total Solitary		23				
Parallel	F	2	4	0	0	6
	C	3	0	0	0	3
	D	6	0	0	0	6
Totals Parallel		11	4	0	0	15
Grand Total Parallel		15				
Grand Total Group		0				
Onlooker		5	5	0	2	8
Grand Total Onlooker		10				
Unoccupied		3	3	0	2	4
Grand Total Unoccupied		6				

Appendix G

Original Measure Used in 1976 Study (Rubin, Maioni, & Hornung)

Solitary:
- Functional
- Constructive
- Dramatic

Parallel:
- Functional
- Constructive
- Dramatic

Associative:
- Functional
- Constructive
- Dramatic

Cooperative:
- Functional
- Constructive
- Dramatic
- Games with rules

Unoccupied & Onlooker

Traditional Measure Used in 1978 Study (Rubin, Watson, & Jambor)

Solitary:
- Functional
- Constructive
- Dramatic

Parallel:
- Functional
- Constructive
- Dramatic

Group:
- Functional
- Constructive
- Dramatic
- Games

Unoccupied

Onlooker

Expanded Measure to be Used in this Study (Based on 1983 Study of Rubin and Daniels-Beirness)

Solitary:
- Functional
- Constructive
- Dramatic
- Games with rules

Parallel:
- Functional
- Constructive
- Dramatic
- Games with rules

Group:
- Functional
- Constructive
- Dramatic
- Games with rules

Onlooker
Unoccupied
Transition
Reading Books
Conversations
Rough/Tumble

Appendix H

Sociometric Instrument - Peer Acceptance/Visibility

Questions:

1. Whom do you like to play with outside?
2. Whom don't you like to play with outside?
3. Whom do you like to sit next to in school?
4. Whom don't you sit next to in school?
5. When you can do anything you want to, with whom do you do it?
6. When you can do anything you want to, with whom don't you do it?

Child's Name _____

1 2 3 4 5 6

Appendix I

Classroom Behavior Observation

Social Contacts Instrument

Direction		Role		Type			Quality		
Adult	Child	Initiate	Respond	Verbal	Nonverbal	Both	Positive	Negative	Both

Appendix J

Teacher Rating Instrument - Social Status

Child's Name:	Pos. Acc.	Neg. Acc.	Combination	Neutral
Mary				
John				
Harry				
Suzanne				

VITA

Jeanne M. Hoover

Candidate for the Degree of

Master of Science

Thesis: A Comparison of Traditional Preschool and Computer Play from a Social/Cognitive Perspective

Major Field: Infancy and Early Childhood

Biographical Information:

Personal Data: Born in Los Angeles, California, December 7, 1942, daughter of Aelred and Geraldine Foley Schanhaar; married Robert A. Hoover, February 22, 1968; Children - Jennifer Jill and Suzanne Elizabeth.

Education: Graduated from St. Mary's Academy, 1960. Received Bachelor of Arts degree from Mount St. Mary's College with a major in English, 1964. Will complete requirements for the Master of Science degree in Family and Human Development at Utah State University in June of 1985.

Professional Experiences: Kindergarten/first grade teacher in Los Angeles City Schools 1964-1968. Kindergarten teacher in Carpinteria Unified School District 1968-1971. Preschool teacher Cache County Head Start Program 1976-1983. Acting Supervising

Teacher Utah State University Children's House 1983-1985. Hold General Elementary Life Diploma for the state of California, C.D.A. Credential, and Utah Elementary Credential with Early Childhood Endorsement.

Awards: Graduate School Fellowship, Spring Quarter, 1985.

Presentations: Language Activities for Young Children, 6th Annual Insights into Early Childhood Conference. July 17, 1984, Utah State University.

Software for the Preschool, Utah Inter-Institutional 10th Annual Early Childhood Conference, June 13, 1985, Westminster College of Salt Lake City.

Professional Organizations: National Association for the Education of Young Children, Utah Association for the Education of Young Children, Cache Valley Association for the Education of Young Children, The National Dean's List, 1983-1984, Kappa Chapter of Phi Upsilon Omicron, Advisory Board Cache Valley Association for the Education of Young Children 1983-1985.