Peer Interaction Associated with Computer use of Preschool Children

A thesis presented to
the faculty of
the College of Health and Human Services of Ohio University

In partial fulfillment
of the requirements for the degree
Master of Science

I-Chen Hsu
November 2007
This thesis titled
Peer Interaction Associated with Computer use of Preschool Children

by
I-CHEN HSU

has been approved for
the School of Human and Consumer Services
and the College of Health and Human Services by

Eugene A. Geist
Associate Professor of Human and Consumer Sciences

Gary S. Neiman
Dean, College of Health and Human Services
ABSTRACT

HSU, I-CHEN, M.S., November 2007, Early Childhood Education

Peer interaction Associated with Computer use of Preschool Children (96 pp.)

Director of Thesis: Eugene Geist

Increasing numbers of preschool teachers use computers to facilitate their curriculum and classroom activities. Some researchers and teachers have debated the appropriate age at which children should be introduced to computers (Cordes, & Miller, 2000; Elkind, 1996). They noted that there is simply not enough research detailing the impact that computers have on the development of young children’s minds and bodies. At the same time, research has demonstrated that preschoolers can benefit if using computers in developmentally appropriate ways (Clements, 1994; Haugland, 1992; Shade, 1994).

Despite widespread studies applying social interaction theory in preschoolers’ peer interaction, there exists confusion over such issues as what kind of social interaction occurs when children are using the computers for play or work. What are the patterns of collaborative interaction when children engage collaboratively with the computer? And how is the activity on the computer influencing the children’s social-emotional development? These issues will be considered in this study.

The purpose of the present research is to study peer interactions at the computer in the preschool classroom. Specifically the researcher examines the patterns of children -children interactions, children-computer interactions, and children-teacher interactions during their free play in the mixed-age and mixed-gender classrooms.

This study primarily adopts qualitative research methods to observe the subjects (age 3-5 children in Ohio University Child Development Center) using computers with peers in their free playing time and explores their patterns of interaction.
The foreshadowed research questions are:

1. What kind of social interaction occurs when children are using the computers for play or work?

2. What are the patterns of collaborative interaction when children are engaged collaboratively with the computer?

3. How is the activity on the computer influencing the children’s social-emotional development?

Approved: ______________________________________________________________

Eugene A. Geist

Associate Professor of Human and Consumer Sciences
ACKNOWLEDGEMENTS

This study was accomplished with suggestions and help of many individuals. I would like to express my deep gratitude to my advisor Dr. Eugene Geist and to the thesis committee: Dr. Angela Baum and Cathy Waller for their invaluable feedback, insight, and support to motivate me throughout my research study. I would also like to acknowledge all my professors and colleagues who taught me and made contributions to my academic skills and knowledge.

I thank my mother, Li-Chu, Hsu-Chen, my father, Chi-Han, Hsu for their continuous support throughout my graduate studies. My Husband, Liang-Kuang, Chen, and my lovely daughters, Joanna, and Emma contributed their great understanding during this study. Without their patience, encouragement, and support, I could not complete my thesis.

Finally, I would truly like to thank Cathy Waller and Ohio University Child Development Center all participants for their help with my data collection and participation in this study.
**TABLE OF CONTENTS**

Abstract .................................................................................................................. 3

Acknowledgement ................................................................................................. 5

List of Figures .......................................................................................................... 9

Chapter 1: Introduction ......................................................................................... 10

Chapter 2: Literature Review .............................................................................. 13
  Introduction ........................................................................................................... 13
  Social Interaction and Computers ....................................................................... 14
  Cooperative Use Learners and the Computers ................................................... 18
  Factors Influencing Peer Interactions at the Computers .................................... 23
    Gender Effect ..................................................................................................... 23
    Age Effect ......................................................................................................... 25
    Software Effect ................................................................................................ 27
    Teacher Effect .................................................................................................. 28
  Conclusion ........................................................................................................... 29

Chapter 3: Methodology ....................................................................................... 31
  Introduction ........................................................................................................... 31
  Participants .......................................................................................................... 31
  Setting .................................................................................................................. 32
  Procedure ............................................................................................................. 33
  Data Analysis ...................................................................................................... 34

Chapter 4: Findings .............................................................................................. 35
  Introduction ........................................................................................................... 35
  Ten Types of Peer Interactions ......................................................................... 36
Conflict………………………………………………………………………… 70
Age, Gender, and Peer Interactions…………………………………… 71
Environmental Settings and Peer Interaction……………………… 72
Recommendations…………………………………………………………… 74
Future Research…………………………………………………………….. 80
Reference………………………………………………………………………. 81
Appendix A: Ohio University Human Subject Consent Form………… 89
Appendix B: Ohio University Human Subject Consent Form (for Teachers) 92
Appendix C: Questionnaire………………………………………………….. 95
Appendix D: Formal Interview Protocol for Classroom Teacher………… 96
LIST OF FIGURES

Figure 1. The Schedule of the Study Procedure......................................... 33
CHAPTER 1: INTRODUCTION

Since the mid-1980s when computers were introduced into classrooms, there have been dramatic changes in early childhood education. Increasing numbers of preschool teachers use computers to facilitate their curriculum and classroom activities. However, some researchers and teachers have debated the appropriate age at which children should be introduced to computers (Cordes & Miller, 2000; Elkind, 1996). They noted that there is simply not enough research detailing the impact that computers benefit the development of young children’s minds and bodies. Elkind (1987) even stated that the use of computers in preschool “…is a good example of miseducation” (p. 87).

At the same time, research has demonstrated that preschoolers can benefit if using computers in developmentally appropriate ways (Clements, 1994; Haugland, 1992; Shade, 1994). The National Association for the Education of Young Children (NAEYC), currently the largest and most influential professional organization for early childhood educators, has endorsed the importance of computers for children in preschool (NAEYC, 1996). According to the authors, the computer programs, which accepted NAEYC, principles of developmentally appropriate practices can be an integral and inevitable component in the early childhood classroom. Some evidence suggests that computers have been found to help children with cognitive, verbal skills, concrete experiences, long-term memory, and social-emotional growth when successfully applied in developmentally appropriate classrooms (Clements, 1987; Haugland, 1992; Haugland & Wright, 1997; Papert, 1998, Shade & Watson, 1990).
The introduction of computers into a preschool classroom is now a common occurrence. An increasing number of preschools, including Head Start programs, offer computer activities to children (Medvin, Spargo, & Falcocchio, 2000). More research emphasizes that children can work cooperatively at the computer and they can be positive learners and helpers (Clements & Sarama, 2002; Paris & Morris, 1985; Shade, 1994). Socialization and peer interaction develop when children share their discoveries and give help to others. They also display more positive emotion and interest when working in groups (Bhargava, Kirova-Petrova, & Ncnair, 1999; Clements, 1994).

Despite widespread studies applying social interaction theory in preschoolers’ peer interaction, there exists confusion over such issues as what kind of social interaction occurs when children are using the computers for play or work. What are the patterns of collaborative interaction when children engage collaboratively with the computer? And, how is the activity on the computer influencing the children’s social-emotional development? These issues is considered in this study to investigate what peer interaction exists in preschoolers as they use computers with mixed-age and mixed-gender peers.

Statistical methods and results cannot fully understand the interrelationship or thoroughly describe the phenomena in the nature setting between or among variables of peer interaction associated with computer use of preschoolers, so this study primarily adopts qualitative research methods to observe the subjects using computers with peers in their free playing time and explore their patterns of interaction.

The purpose of the present research was to study peer interactions at the computer in the preschool classroom. Specifically the researcher examined the
patterns of children-child interactions, children-computer interactions, and
children-teacher interactions during their free play in the mixed-age and mixed-gender
classrooms.

This study includes five chapters. Chapter 1 contains an introduction of the
research background, problem, purpose, and research questions. Chapter 2 includes a
review of the relevant literature, including three sections: (a) social interaction and
computers, (b) cooperative use learners and the computers, (c) factors influencing
peer interactions at the computers. Chapter 3 gives a detailed description of the design
of this study, including subjects, setting, and study procedure. Chapter 4 contains an
analysis of the data from subject and the field notes of observation. The findings that
address the research questions are described fully in this study. Finally, Chapter 5
concludes this study; hence, discussion, conclusions, and recommendations for future
research appear in this chapter. References and appendixes follow.
CHAPTER 2: REVIEW OF LITERATURE

Introduction

The use of computers in schools has increased dramatically in recent years. The rapid immersion of computers has taken place at all educational levels. In preschools, computers gradually form an integral part of children’s education and play experience. There have been great changes in the number of teachers using computers with young children. Eighty to ninety percent of early childhood educators attending the annual conference of the National Association for the Education of Young Children (NAEYC) reported using computers in daily classroom activities (Haugland, 1997). Such using is receiving great attention from parents, teachers and researchers.

The introduction of computers into the preschool classroom has been met by skepticism in some educators and enthusiasm in others. One of the concerns is that computers may lead to isolation, diminished social interaction, and deficiencies in language (Barnes & Hill, 1983). Elkind’s (1996) suggestion reflects his concern that avoids believing that unfounded assumptions about children’s cognitive development based on their computer proficiency. Healy (1998) is concerned that when young children spend an overabundance of time with computers, the development of the child’s brain may be impeded. Cordes and Miller (2000) have noted that emphasizing the use of computers in childhood can be hazardous to children’s physical health, such as repetitive stress injuries (RSIs), visual strain, obesity, and other unhealthy consequences of a sedentary lifestyle. Children still need active learning experiences involving real objects that they can manipulate (Armstrong & Casement, 2000).

On the other hand, many researchers are convinced that preschoolers can use computers in developmentally appropriate ways. The National Association for the

A more recent emphasis, however, has been on the social development of computer use (NAEYC, 1996). Some researchers indicate that children work cooperatively at the computer (Clements & Sarama, 2002; Orleans & Laney, 2000; Paris & Morris, 1985). Children share their discoveries and give help to others. They also display more positive emotion and interest when working together (Bhargava et al, 1999; Clements, 1994; Shade, 1994). This project is limited to focus on preschoolers’ peer interactions at the computers and their social development.

This review is divided into three sections: (a) social interaction and computers, (b) cooperative use learners and the computers, (c) factors influencing peer interactions at the computers.

Social Interaction and Computers

It is widely believed that the role of social interaction in children’s cognitive development is important. The potential benefits of social interaction are supported by Piaget and Vygotsky’s theories of development. In Piaget’s views (1960), the child’s intellectual adaptation is as much an adaptation to the social environment as to the physical. Piaget mentioned that the importance of peer relations in his conception about social development. He stated that peer interactions are crucial to the child’s
construction of social and moral feeling, values, and social and intellectual competence. The major theme of Vygotsky’s (1978) theoretical framework is that social interaction plays a fundamental role in the development of cognition. He believed that the life long process of development was dependent on social interaction and that social learning actually leads to cognitive development. According to Vygotsky, humans use tools that develop from a culture, such as speech and writing, to mediate their social environments. Initially children develop these tools to serve solely as social functions, ways to communicate needs. Both Vygotsky and Piaget have presented the importance of interaction with others for learning (Lomangino et al.’1999). They also argued that children’s cognitive systems are strongly influenced by their social environment. Piaget assumed that interaction with same-age peers promoted the diminution of egocentrism and more mature reasoning. Vygotsky hypothesized the role of older children as instructors who transmit culturally valued knowledge (Diehl, Lemerise, Ramsay, & Roberts, 1998). Although some research addresses young children have been assumed lacking competence and skills of conflict management and problem solving. There is also some research with preschool children indicating that even for young children from the age of 4 to 5, can interact well and effectively with peers (Perlmutter, Behrend, Kuo, & Muller, 1989; Rhee, & Bhavnagri, 1991).

Several studies being conducted today indicate that using computers can contribute to children’s self-perception and affect their socialization in different ways in schools. For preschoolers and kindergarteners, Hohmann (1994) stated that the computers and appropriate software offer positive social consequences. Children find working together on computers irresistible (Clements, 1994) and sharing a computer with peers often has been found to lead to group interaction and cooperation rather
than social isolation (Orleans, & Laney, 2002). They also effectively create a connection as they complete and solve problems together.

Additionally, developmentally appropriate software offers opportunities for children’s collaborative play, learning, and creation (NAEYC, 1996).

Human beings need to be actively engaged with the social environment, especially young children. Many adult-child interactions may be described as adults “scaffolding” children’s behaviors and thoughts, while peer interactions can be described as children “co-operating” behavioral outcomes (Ashley & Tomasello, 1998). Piaget (1928) stated that young children benefit from peer-based learning environment because a natural egocentrism needs to be challenged. But, can an egocentric child learn collaboratively with peers? Tudge and Winterhoff (1993) proposed that in a rather balanced situation, children are more likely to express disagreement and suggest ideas to their peers, rather than concede to others. When children repeatedly view others as having opinions different from their own, their egocentric speech gradually declines and is replaced by social speech, and they begin to learn collaboratively with peers. Therefore, peer interaction plays a central role in children’s development, such as in language development, cognitive development, conflict management, and cooperation. Especially for preschoolers, through daily social activities, peer interactions provide fellowship, support, intimacy, company, and recreation which cannot be replaced by parental or sibling interaction (Hartup, 1989).

Due to limited number of computers in most preschool classrooms, young children have many opportunities to share a computer with one or two partners. Clements (1994) has discovered that children spent nine times as much time talking to peers as on the computer as they did doing puzzles. Perlmutter, et al. (1989) observed
that preschoolers who worked in pairs engaged in peer interaction at an average rate of almost three interactions per dyad per minute, and showed more positive affect than did children who worked with the computer individually. Their findings with simple computer games confirmed that young peers can effectively interact, providing instruction and directions to facilitate problem-solving activity. Both observational and child ratings showed that 5-year-olds are more satisfied when working with a peer than when working alone. During collaborative computer use, cognitive and social development should be gained when children express their dislikes, disagreements, exchange ideas and offer suggestions. Peers with different skills and competencies on computers can provide each other with strong assistance (Lomangino et al, 1999). Thus, when children use computers collaboratively, they will benefit from their peer interactions more, especially if their partners have different areas of competence.

Peer tutoring is one type of peer interaction. It is an approach in which one child instructs another child, in which children help each other and learn by teaching. Both tutors and tutees benefit through the process of instruction (Hoysniemi, Hamalainen, & Turkki, 2003; Paris & Morris, 1985). Peer tutoring allows children to be more exploratory and less goal-oriented when involved in an appropriate activity with a peer. Through peer tutoring, children gain higher order cognitive development, such as asking appropriate questions, providing proper explanations, and using supportive communication skills (King, Staffieri, & Adelgais, 1998). Brownell and Carriger (1990) investigated the ability of toddlers and preschoolers to coordinate their behaviors in a series of problem-solving tasks.

Compared with the children of 12-, 18-, 24-months of age, 30-month-olds were the only age group to make extensive use of directive verbalizations to influence their
peers’ behaviors. Koester and Bueche (1980) have observed that instructors (4-year-olds) preferred nonverbal to verbal instruction, using mostly nonverbal demonstrations and physical assistance to their partners (3-year-olds). Generally speaking, children attempt to solve problems with peers and they become more skillful instructors if they experience peer tutoring in the early ages.

Clements (1994) has noted that children usually turn to each other, rather than an adult, for computer help, even if an adult is available. They prefer to rely on experienced peers when working with open-ended, developmentally appropriate materials, which require higher order thinking and complex mouse and keyboard manipulation (Shade, 1994). In addition, they enjoy sharing leadership roles more frequently and develop positive attitudes toward learning. Paris and Morris (1985) have observed that young children can be effective teachers and helpers. The roles of skilled teacher and helper may alternate during the collaborative activity, depending on the needed competence of the activity. Children of preschool age use both verbal instructions and demonstration as successful teaching techniques.

Therefore, according to these theoretical perspectives, when peers have different levels of competence at computers, children benefit from instructions of each other. Their social development occurs when they interact positively in communication that includes body language, providing elaborate questions and responses, and instructions.

Cooperative Use Learners and the Computers

According to Vygotsky’s (1978) theory, to young children, both the teacher and older children are very important for their social and cognitive development. Children’s minds are constructed through interactions with the people they meet
everyday. The Zone of Proximal Development (ZPD), Vygotsky’s best-known concept, argues that with help from adults or more experienced peers, children can master what concepts and ideas they cannot understand on their own. According to Vygotsky:

The zone of proximal development is defined as the distance between the actual development level as determined through independent problem solving and the level of potential development as determined through problem solving under adult guidance or collaboration with more capable peers (p. 86).

Vygotsky proposed that the joint activity involves the use of mediating tools, which could be discrete symbolic systems such as language or numbers, or symbol manipulating devices such as computers. For example, a computer in the classroom is a good tool that a teacher provides as a structure of support for children who are aiming at achieving a goal. During peer interaction, partners with different skills and competences can provide each other with the skilled assistance, which can reach other’s ZPD.

Crook (1994) analyzes several ways in which computers can be part of the collaborative experience of learning. For example, collaboration at computers refers to that children not only work with computer, but also support each other. In addition, collaboration in relation to computers means that small groups of children work on the same computer activity at the same time (Pange & Kontozisis, 2001).

Collaborative activity and interaction in small groups between teachers and children or children and children facilitate intellectual development by providing chances to expose learners to alternative ideas. The event shows that the computer is an ideal
vehicle for preschool children learning in a social setting. They find working together
to be irresistible, find opportunities to stretch each other’s ZPD, and enjoy helping
and solving problems together.

Although participating in solitary and parallel play frequently, cooperation
among children, where they celebrate each other’s success, encourage each other to
do their best work, and learn to work together no matter what ethnic
background, gender, intelligence or physical ability (Johnson & Johnson, 1987).
Cooperative learning is a learning strategy that involves children working
collaboratively in small groups, ensuring that all members master the assignments.
When learning to work cooperatively, children not only need to be taught the
cooperative skills, but also be offered the opportunities to use them. Cooperative
skills include the ability to establish and manage the group, interpersonal
communication, understanding the materials, the knowledge of interaction with peers
(Johnson, Johnson & Holubec, 1986).

Preschool children have more positive and rewarding experiences with keeping
conversation going, cooperating, and planning with peers than with adults or siblings
(Berk, 2000). These positive and rewarding experiences of social interactions have
been demonstrated that young children would love to share using the computer with
their partners. Literature confirms that cooperative computer use is often associated
with the social nature of interactions and the collaborative activities on computers
(Haugland & Wright, 1997; Perlmutter et al., 1989). It also has been observed that the
successful work of children’s computer-mediated collaborative learning activities
within an early childhood classroom (Lomangino et al., 1999). In addition, Muller
(1983) has noted that in the computer-based preschool classroom, children work with
peers most of time, during which they often instinctively share and instruct each other. Children also are capable of interacting with a computer and working cooperatively with their peers, without management by teachers. However, Lomangino et al. (1999) suggest that teachers need to be aware of both positive and negative peer conversations and actions that often accompany young children’s collaborative learning. Consequently, through cooperative learning, children will realize that one needs to rely on and have connections with others to be successful in their computer work.

Conflict, according to Campbell, Campbell & Dickinson (1999), can be viewed as a challenge that teaches children positive and constructive ways to express disagreement. Therefore, conflict is a normative function of any relationship, which provides the opportunities of problem-solving and social interaction for children (Shandz, 1987; Vespo & Pedersen, 1995). Howe and McWilliam (2001) noted that social conflict between peers might benefit the individual learning and the skills of critical appraisal. Some researchers point out that peer conflict contributes to children’s cognitive development and performs an important aspect of social interaction if managed successfully (Notarius & Markman, 1993).

For preschool children, the classroom is second only to family in shaping their attitudes and values. It is also a suitable place for children to learn conflict management. Researchers have stated that activity context influences the frequency of conflicts. For example, Tizard and Hughes (1984) reported that most conflict occurs during sand and water play in preschool. Minuchin and Shapiro (1983) observed that most conflicts happen when children are involved with block building and housekeeping play. Through managing conflict with peers, young children have
opportunities to share ideas, doubts, opinions, and explanations. They also learn how to collaborate, negotiate, and share with each other. Actually, most of the time, preschool children have the capability to solve conflicts on their own (Wheeler, 1994).

Campbell et al. (1999) described six common causes of conflict: individual needs are not being met, power is inequitably distributed, communication is ineffective or non-existent, values or priorities differ, perception of a situation varies and learning approaches or personalities differ. Through analyzing the causes, teachers can discover children’s personal conflict styles and develop strategies to enhance management of a conflict situation. Hence, teachers still have a central role to play in a conflict solution. They need to provide suggestions and advice to children about how to deal with conflict with their peers.

Interpersonal intelligence, one component of Howard Gardner’s theory of Multiple Intelligences, allows people to form relationships, helps people get along with others, discern moods, temperaments, motivations, and skills (Gardner, 1993). Campbell et al. (1999) list twelve characteristics of a person with highly developed interpersonal intelligence. There are some examples that may happen in preschool classrooms, such as bonds with parents and interacts with others, forms and maintains social relationships, recognizes and uses a variety of ways to relate to others, and understands and communicates effectively in both verbal and nonverbal ways. In preschool classrooms, interpersonally-skilled children enjoy interacting with others of similar or mixed ages. With an ability to influence their peers, they are often good at group work, problem solving, peer tutoring, discussions, and cooperative learning.
Teachers are expected to arrange group activities that can facilitate the development of interpersonal intelligence (Gardner, 2000). For example, the computer-based classroom provides a good environment for children to develop their interpersonal intelligence. As mentioned before, children prefer to use computers in pairs or small groups, which facilitate and accelerate their comprehension and learning. Through the interaction, children develop their skills in mediation by working with others of diverse ages or background. They also learn to express and exchange their feelings, thoughts, behaviors, and emotions with others. Additionally, children learn the skills to influence the opinions or actions of peers. They know how and when to adapt their action to different situations and get different feedback from peers. With the dramatic technological change, teachers even can use teleconferencing linked through a communication system which children can experience face-to-face contact in other classrooms, schools, or countries (Dickinson, 1998). Thus, in order to help children learn cooperation with their peers, and manage their conflict, creating an interpersonal activity environment becomes a priority of preschool teachers.

Factors Influencing Peer Interactions at the Computers

Plenty of research indicates that children’s peer interactions at the computers are influenced by such factors as follow:

Gender effect. The majority of research has noted the role of gender in children’s activity preferences. Based on the analyses from early studies, Tomes (1995) has indicated that boys prefer adventurous, superhero fantasy play roles, wheel toys and blocks, while girls prefer art and doll play. Some studies have showed that gender differences exist in computer interest, use, and competence. Boys tend to have more positive attitudes toward the computer and to display greater use under free-choice condition (Wilder, Mackie, & Cooper, 1985). Clarke (1990) advances the
statement that most primary-aged children have a high interest in using computers, with boys showing a greater interest than girls.

Preschool aged boys consistently have more computer experiences than girls. Shade (1994) found that girls responded more positively to the more developmentally appropriate software while boys were more excited about the low level, more competitive drill software.

The issue of gender also affects the peer relationship in many ways, including conflict management, and cooperative learning. Maccoby and Jacklin (1987) mention that preschool-age boys engage in more body contact and they prefer expressing their feeling and emotions by verbal and physical fighting to girls. Preschool boys also tend to affirm their dominance, use commands and threats, and refuse to perform what they want. The same-gender groups of female have a higher level of interaction than groups of boys. They also offered and requested more help than the same-gender groups of male students (Busch, 1996). Studies also show that the majority of peer interaction occurs in same-gender groups. From the beginning of the toddler period, children prefer to interact with peers of their own gender. Therefore, most conflicts occur in same-gender dyads (Alexander & Hines, 1994).

The American Association of University Women (AAUW) has reported in a recent study that technology presents the new gender gap for girls. Janice Weinman, AAUW Executive Director, said that “girls have narrowed some significant gender gaps, but technology is now the new ‘boy club’ in our nation’s public schools” (Morrison, 2001, p. 20). The most serious problem causing the gender gap is society’s expectation and perception that technology is not a “girl thing.” Additionally, adults, movies, television, commercial products, and toys also
contribute to children’s sex role stereotypes. Bhargava et al. (1999) found that the majority of available software is more appealing to boys than girls. Even the educational software is designed with male characteristics.

Fortunately, recent research suggests that gender bias is mild or nonexistent in preschool and kindergarten (Bergin, 1993; Clements, 1987). When preschool children first use the computer, they are all beginning at the same level. Perceived differences may come from gender stereotypes, not from intellectual or competence differences (Helf & Swaminathan, 2002). The position statement on technology and young children from The National Association for the Education of Young Children (NAEYC, 1996) supports that children have right to equal access to technology and calls for attention to eliminate gender stereotypes. By the age of four children already show some gender specific habits and accept that boys and girls are different in appearance and behaviors. Thus, it is an important and critical time to introduce computers to preschool aged children before they are influenced by the impression of gender stereotyping (Bhargava et al., 1999).

*Age effect.* The role of age appears to be robust in children’s social development. Same-age and mixed-age peer experiences offer different stimulation and opportunities to children’s mental and physical development, language, emotion, cognition, intelligence, and experience. Interaction with same age peers is considered to provide a unique environment for children to engage in and solve cognitive conflict with peers who are more likely to be equal in knowledge, skill, and power. Interaction with older, more competent children is viewed as an ideal model for facilitating cognitive and behavioral development. Interaction with younger children is considered to provide older children a chance to
practice and develop personal self-regulatory and leadership skills (Winsler et al., 2002).

In a mixed-age classroom, children have to face some issues such as communication in age gap, modeling simulation, and different attitudes in dealing with conflict. For example, during the activity of playing on the computer, young children are usually egocentric and cannot control their emotions and time management. But older children usually have better language skills and cognition to negotiate and solve problems. Vespo and Pedersen (1995) have observed that conflicts in preschool classroom are rather brief and most processes are harmonious. Preschoolers communicate with peers either verbally or through gesture. Older children, predictably, are more likely than younger children to use verbal behaviors, such as asking for something or specifically making a request.

In a computer-based learning classroom, mixed-age groups benefit from the variety of peer interactions. Shade (1994) observed 4 to 8-year-olds use of the computer. This observation indicated that older children reveled more enjoyment when they were together, even with randomly selected peers. This finding suggests that the enjoyment from working together at the computer is one of the positive social benefits. Shade (1994) also reported that young children did show slightly more negative emotions than did older children when working with computers. Moreover, the younger children at the age of 4 and 5 years old responded more positively to highly developmentally appropriate software and older children were often more positive with lower level and more drill software. One possible explanation as to why older children prefer the game-like drill software may be because they enjoy winning by cooperating together with peers.
Software effect. Since computers were introduced into classrooms, the software market has boomed. Selecting software from such huge quantity of programs is the most critical decision for teachers and administrates. Their decisions not only directly relate to their teaching philosophy and education goals, but also influence their students’ cognitive and social development. In order to help teachers and administrates, Haugland and Shade (1988) defined developmentally appropriate software with the Developmental Software Evaluation Scale (DSES). They described that the characteristics of the developmental software are open-ended, easy enough and attractive for children to explore, can be used independently, and provide appropriate speech, and high level of interactions (Haugland & Shade, 1988, 1990).

Shade (1994) divided software into two groups. One is drill and practice, such as close-ended games, numbers, colors, shapes and letter recognition programs. Children can only the respond with yes or no answers. It has been estimated that about 80% of the software for children aged 3 to 8 is drill and practice programs. The second group is developmentally appropriate, which reflects the thinking of the user, such as drawing programs, problem-solving activities, word processors, and Logo. According to Haugland’s observation, young children at the age of 4 to 5 spent three times as much time at the computer with non-developmental software. Their test scores show that they had notable gains in short-term memory, self-esteem, and concentration, but decreased in creativity by 50%. On the other hand, the children exposed to developmental software benefit in intelligence, verbal skills, problem solving, structural knowledge, long-term memory, conceptualization, and creativity (Haugland, 1992).
*Teacher effect.* With the increasing number of young children spending increasing amount of time in preschool, the teacher plays a significant role in their cognitive and social development. Brunet (1980) and Oettingen (1985) both reported that a teacher’s presence had a vital impact on young children’s time and activity choice.

Particularly in the computer-based classroom, the teacher needs to assist children in using the computer appropriately. First of all, the teacher must design a computer area in the classroom. The best place is in the middle of the classroom and along one wall of the classroom, where children can easily see the computer (Haugland & Wright, 1997; Hohmann, 1994). Furthermore, the teacher needs to know how to select developmentally appropriate software. The position statement on technology issued by NAEYC (1996) indicated that the computer could be a positive influence if the teacher applies the guidelines for developmentally appropriate practice (DAP).

Additionally, it is widely believed that children will develop cognitively if they interact with an adult while using the computer. In Costello’s (1996) perspective, it is inappropriate if a child is placed in front of a computer without close monitoring from an adult. The children are more attentive, more interested, and less frustrated when a teacher is present. Effective integration of computers in preschool classrooms depends on teachers’ ability to change the traditional role of teacher-as-knowledge-provider and instructor to teacher-as-organizer, diagnostician and guide, learning partner, helper, and mediator of computer-assisted learning at early childhood environment (Clements et al., 1996; Samaras, 1996).

Klein, Nir-Gal, and Darom (2000) reported that mediation is the most beneficial type of preschool teacher guidance using computers. Through the child-computer interaction, the teachers provide guidance including
encouragement, focusing, affecting, and expansion. They understand the child’s needs, interests, and abilities, then connect and associate between the child and the computer. Most of the time, young children’s need for teacher mediation is seeking technological help. Through mediation, the researchers also found that children enhanced their cognitive abilities and “learned to focus on a problem, to seek and receive precise information..., to compare and contrast various perceptions and to plan before acting” (p. 604). Furthermore, their finding suggests that the integration of mediating teachers in the processes of teaching and learning within computer environments benefits preschoolers’ learning. However, excessive teacher monitoring diminishes group discussion. The teachers need to be involved in meaningful communication with children. They also should monitor and observe when and how to interact or interrupt children’s work.

Conclusion

There is much surrounding the impact of computers on preschoolers with special needs (Schery & O’Connor, 1992), developmentally appropriate software (Haugland, 1992; Haugland, & Shade, 1988), gender variations (Tomes, 1995; Williams & Ogletree, 1992) and their overall developmental progression (Haugland’1992). However, peer interaction is a vital part of the preschool classroom associated with computer use. Peer interaction is not only a social interaction which influences children’s cognitive and social development, but also a learning method that applies to cooperative learning, conflict management, the theory of ZPD, and interpersonal intelligence.

It is important that educators emphasize the role of computers in preschool classrooms. There is a need for early childhood studies that describe the relationship
between preschoolers’ peer interaction and computers. Finally, due to the variety of findings surrounding the age and gender issues of preschool classrooms, future research should address preschoolers’ peer interaction associated with the use of computers in the mixed-age and mixed-gender context of preschool classrooms.
CHAPTER 3: METHODOLOGY

Introduction

This research study uses qualitative methods to explore the factors that affect the development of preschool children’s peer interaction when they use computers for play and work.

The foreshadowed research questions are:

1. What kind of social interaction occurs when children are using the computers for play or work?
2. What are the patterns of collaborative interaction when children are engaged collaboratively with the computer?
3. How is the activity on the computer influencing the children’s social emotional development?

In this chapter, there are four sections including participants, setting, procedure, and data analysis to organize the methodology in this research study.

Participants

This research study was conducted at a University laboratory school. There were 82 Caucasian children, three Asian Americans, and 16 international children. The children were from lower to middle class families. The participants are 52 children (31 boys and 21 girls) in preschool classes of the center. The ages of subjects were from 3 to 5. They were exposed to play on computers for at least 6 months before this study began. Ninety-five percent of children have computers at home. One hundred percent of children report that they have experiences with playing computers. When they do daily classroom activities, every child has free opportunities to select what
they want to do. Using the computer is one of the classroom activities. All participants will be observed when they choose the activity of playing computers from sitting in front of computer screen to leaving. Their parents have given permission for their children to participate in the study.

Setting

Using computers is one of the classroom activities for preschool children at this center. There is one computer set up in a comfortable and bright place in the three preschool classrooms. In Room 213, the computer is located inside the classroom. In the Rooms 205 and 219, the computer is located outside the classrooms, in the hallway. The table and chairs is suited for children’s height and the open space allows them walk without limitations. Several multimedia software and CDs put on the shelf aside the table easily to get for children. The (IBM) formatted computer has already installed appropriate software for children to operate easily and conveniently. The setting is attractive for children to play at the free-choice time.

In this study, the researcher is only an observer and recorder. The role of the main teachers and student teachers is to be facilitators to help children solve any problems, but only when children really need help. All teachers will give any help at right time and right moment. The participants are observed during their free-choice time in the morning from 7:30 to 9:00 and afternoon from 2:30 to 3:30 every day. During those times, the subjects can choose from among computers, books, dramatic play, blocks, stage dancing, or art activities. At that given time, at least two to three teachers are in the room with the children. The time of observation depends on the activity needs of playing computers and the range may be from 1 minute to more than 30 minutes.
Because computer playing was settled in free-choice time, teachers did not have any curricular and instructional design for the activities. Teachers did not control children’s behaviors or discussions. Teachers let them to handle any happenings, but were involved at the any right moment. In addition, the evaluation of software was not included in the study.

Procedure

The research study was conducted in the Spring Quarter from (the 3rd week to the 8th week), 2004. At about the 5th week period, the researcher visited every classroom in the school day to collect and record observational data. During each visit, children who volunteered to use the computers in free-choice time are individually observed.

The schedule of the study is shown on the Figure 1.

![Figure 1. The schedule of the study procedure.](image)

During the observation period, the subjects play with one computer. Sometimes, another child or even more will join in as an observer. All observations of the children are done through non-participant observation, with field notes and pictures being the primary form of data. After the observation, the teachers participating in the study will be interviewed at the ninth week to better understand their feeling from their angle about children using the computers and their involved experiences.
Although the software offered in the classroom will not be evaluated in the study, all software used in the classroom contains a variety of activities, including free painting, scene creation game, counting games, drill and practice for easy math and science, puzzle games, and some story and music CDs. The software offers structured activity involving basic problem solving, logical-practicing and intellectual-developing experiences such as sorting, matching, and counting, as well as hand-eye coordination such as painting and mousing.

All teachers will be interviewed at the 9th week of the study. Each 10-question interview will be audio taped about 10-15 minutes. The interviews will be transcribed.

Data Analysis

The observational notes will be analyzed using a context analysis procedure to delineate themes that may emerge from the interaction the children had at the computers. These themes will be used to examine the three foreshadowed research questions:

1. What kind of social interaction occurs when children are using the computers for play or work?
2. What are the patterns of collaborative interaction when children engaged collaboratively with the computer?
3. How is the activity on the computer influencing the children’s social-emotional development?

If the themes reveal new questions, more observations and recordings may be necessary. Interviews will be analyzed in a similar way to look for themes and similarities between the answers. These were compared to the literature and observations to gain greater insight into the foreshadowed research questions.
CHAPTER 4: FINDINGS

Introduction

The study was based on observation to study peer interactions at the computer activities in preschool classrooms, especially to examine the patterns of children-child interactions, children-computer interactions, and children-teacher interactions during their free play in the mixed-age and mixed-gender settings. The study explored:

1. What kind of social interaction occurs when children are using the computers for play or work?
2. What are the patterns of collaborative interaction when children are engaged collaboratively with the computer?
3. How is the impact of environmental settings influencing the child’s peer interaction development?

As discussed in Chapter 3, a major method was the process of observing preschoolers and interviewing teachers at a University Laboratory School. The research was conducted in the Spring Quarter, 2004. For about a five-week period, the researcher visited the preschool classrooms every school day to collect and record observational data. During each visit, children who volunteered to use the computers in free-choice time were individually observed. The teachers participating in the study were interviewed to better understand their feeling from their angle and attitude about children using the computers with peers and their involved experiences.

The field notes of observations and the transcriptions of interviews were the main form of data. All data were coded and categorized using a qualitative content analysis methodology. In the pages that follow, the researcher presents three themes:
(a) ten types of peer interactions; (b) the impact of gender and age; and (c) the limits of settings.

**Ten Types of Peer Interactions**

Based on the data of the field notes of observations and the transcriptions of interviews, the researcher coded, analyzed, and categorized 10 types of peer interaction. These 10 types of interactions are: accepting guidance, asking for help, aggressing, defending control, ignoring, directing partner’s action, sharing control, showing pleasure, showing displeasure, and playing alone.

**Directing partner’s action.** A pair of children was set a group to play computer. One was the computer controller, and the other was a watcher. Sometimes, the watchers provided guidance, suggestion, and opinion to the computer controllers. On the other hand, the controller directed or guided his or her partner’s thinking and behavior.

[Child (#9) played the computer and Child (#1) stood up to watch.]

Child (#1) [pointed the screen]: I might that one….black….yah.

[Child (#9) did what he said.]

Child (#1) [pointed the screen]: Don’t do that…do this…blue on it.

Child (#9) did not say anything but just followed her partner’s (#1) suggestion.

Another example, Child (#3) played the software with Child (#7).

Child (#7): he [the character] needs that hand. [Pointed the screen]…I’m that guy.

Child (#3): I want to change this.

Child (#7): Ok! Do it.

Child (#3): Ok, I did.
Child (#7): where? Put that ghost’s hands.

Child (#3): haha...

Child (#7): put that hat.

Child (#3): Ok, I know, I know. Oh, cool.

These two boys directed each other. When one gave another one suggestion, one accepted the guidance and made happy each other.

[Child (#4) used the computer and Child (#11) sat beside her.]

[Child (#11) looked like very happy. She sucked her thumb and moved her body with the music from the computer. When the timer alarmed, Child (#4) stood up and wanted to leave.]

Child (#11) [moved to the user’s seat]: I want you to stay and watch, come here and sit with me.

[Child (#4) came back and sat down.]

[Child (#11) kept the work which Child (#4) did not finish.]

Child (#4) [pointed the screen]: click that one.

[Child (#11) did. And then two girls giggled.]

Child (#11): That’s fun.

Child (#4) [pointed the screen]: go to there…go the way there…make it higher…go there…go there…

Child (#11): I know.

[Later]

Child (#11) [guided her partner]: I want to do that later. I want to do this first.

[Child (#4) kept silent and watched.]

Child (#4): no.
Child (#11) [pointed the dropping sign]: dda…daaa…back…back…oooo….this is not very fun.

Child (#4): Oh…I told you!

Child (#11) [clicked on the stop sign and hummed]: dada…da….

Child (#11): I will do it again!

Child (#4) [saw other kids laughing]: What are you guys doing?

[When the timer alarmed, Child (#4) left and Child (#11) too.]

Observing and modeling were the ways children did in their peer interactions. When Child (#11) was a watcher, she observed what Child (#4) did. When it was her turn, she did what she observed from her partner (#4). Child (#4) was a model when she performed what she did. After exchanging the seat, the role of observer and model was changed.

Sometimes, the computer controllers did not see the whole situation. The watchers provided more useful suggestions and directions. When Child (#9) played the computer and Child (#6) watched.

Child (#6) [pointed the screen]: this is a weird part. You need to try it.

Child (#9) [clicked the spot where her partner (#6) said]: yah, you are right.

Another observation, when Child (#5) played alone and 4 minutes later, Child (#4) came to sit down.

Child (#4) [pointed the screen]: click on that.

[Child (#5) did what his partner (#5) said.]

Child (#4) [pointed the screen again]: click that, click that.
[Then Child (#4) jump away happily because Child (#5) got the high points and won the game.]

Child (#5) did what Child (#4) suggestion. He finished his works until the timer alarmed.

Sometimes, when the computer controllers could not control the whole situation, the watchers provided some guidance or jumped to control the situation directly. Child (#14) played the computer and Child (#16) watched. When Child (#14) clicked on the black clouds, there were sounds of thunder. Two kids laughed happily.

Child (#16) [pointed the screen]: click that way.
[Child (#14) did.]

[Any strange sounds made them very happy and laughed a lot.] Child (#16): come…click on that again.

Child (#14) could not control the mouse well, and his partner (#16) helped him to control the mouse. [He held his hand to control the mouse.]

Child (#16): click on below…the rocket fire…click here [pointed the screen.]
[They did together.]

Another observation, when Child (#23) played Counting Number, Child (#21) watched.

Child (#21) [counted the balloons]: 1, 2, 3, 4, 5, 6, 7… wow.
Child (#23): No…no…It is not correct.
Child (#21): Let’s do again! Oh! No. The mouse is so strange.
Child (#23): Let me do it and you count.
Child (#21): OK!

[Child (#21) gave the mouse to Child (#23) and looked at the screen.]
Child (#23): Count carefully. 1, 2, 3, 4, 5…

[Child (#21) used his point finger to count each number with the mouse moving.]

[One teacher came and looked at what these two kids did.]

Teacher: Wow! You guys do a good job.

Some children just provided the hint that allowed their partners to solve the problem by themselves. When Child (#15) wanted to type her name, she didn’t know how to erase the names people left before. Her partner (#22) stood up and pointed the garbage can without saying anything. Child (#15) did and typed her name successfully. She smiled.

From the observations, children wanted to guide or direct someone’s actions. Some actions were aggressive, but some were gentle. Fortunately, most of children respected each other.

Accepting guidance. When children played the computer, some children provided guidance to influence their partners. From the observations, the researcher found that when one child controlled the computer, he or she accepted his or her partner’s guidance.

Child (#9) played the computer and Child (#8) stood up to watch. Child (#9) was coloring a picture on the program.

Child (#8) [pointed the screen]: I might that one…black…yah.

[Child (#9) did what he said.]

Child (#8) [pointed the screen]: Don’t do that…do this…blue on it.

Child (#9) did not say anything but just followed her partner’s suggestion. When Child (#9) controlled the computer, her partner tried to provide his guidance that affected the computer controller to change her action and thinking. Another
observation, one child (#6) pointed the rabbit on the screen and said, “Click that way.” His partner Child (#2) did what he guided. While they finished all the questions, Child (#6) raised his right arm and said, “yah!” And he said, “Click on the stop button.” Child (#2) accepted his partner’s guidance and completed their computer activities.

From some observations, in order to involve in the activity, the partners gave guidance to the computer controller to win the games or complete the tasks successfully. When Child (#4) played the computer,

Child (#6) [pointed the screen]: this is a weird part. You need to try it.

Child (#4) [clicked on the spot where her partner pointed]: yah, you are right.

When the partner provided the correct directions, the computer controllers succeed the activities more often. Child (#23) played the computer with the partner (#21). They tried to answer the questions on the program.

Child (#21) [pointed the right answer]: here, here.

[He always got the right answer before Child (#23) did.]

Child (#21): ha, rug [pointed the right answer on the screen.]

Child (#23): what?

Child (#21): book [pointed the icon on the screen.]

There were more than five times Child (#23) followed his partner (#21)’s directions to get the right answers. Finally they won the game. Sometimes children accepted guidance unwilling.

Child (#23): owe, you know how to do it? Why are you been there?
[Pointed the screen.]

[Child (#20) pulled his partner (#23)’s hands down.]

Child (#23) [pointed the screen]: click on…do it.

[Child (#20) did.]

Child (#23): You see…I’m right.

Child (#23) pointed the screen, and Child (#20) pulled his hands down again. But he still followed his partner’s suggestion, and he finally got the right answer. Child (#23) was so happy and said, “ha-ha…wipe that away…let’s play again!”

Most of time, children who controlled the computer accepted their partners’ guidance without angry. When Child (#11) used the computer and Child (#4) watched.

Child (#4) [pointed the screen]: click that one.

[Child (#11) did. Two girls giggled.]

Child (#11): That’s fun.

Child (#4) [pointed the screen]: go to there…go the way there…make it higher…go there…go there….

Child (#11) [hit Clare’s hand]: I know.

Child (#4) [clicked on the stop sign]: go there go there.

Child (#11) [did what her partner said]: OK! …Yes!

There was no angry when they played the computer. The guidance provide from partners did not make the computer controller uncomfortable. Controversially, she accepted the guidance and had wonderful experiences with her partner.
Some child presented expresses and behaviors happily when they accepted their partners’ guidance. When Child (#20) played the game *Shooting Balloon* and followed his partner Child (#17)’s guidance to get very high scores, he smiled so happily. When Child (#6) did what her partner Child (#4)’s suggestion and attained their goal for solving the problems, she jumped highly and excited. Lots of conditions, when processing the computer activities, children played the software with lots of fun and laughs.

Child (#19) played the computer and Child (#16) watched. When Child (#19) clicked the black clouds on the screen, there were sounds of thunder. Two kids laughed happily.

Child (#16) [pointed the screen]: click on that cloud and do that way again.
[Child (#19) did.]

Any strange sounds made them very happy and laughed a lot.

Child (#16): come here….click on that again.

[Child (#19) could not control his mouse well, and Child (#16) helped him to move mouse again.]

Child (#19): click on below…the rocket fire…click on here [pointed the screen]
[Child (#16) did.]

These two boys enjoyed and involved the program. The program also made them happy to play together. Although they exchanged the position to control the computer, they helped each other and had a good deal of fun. Here is an example when Child (#3) played the software *Chicka Chicka Boom Boom* and Child (#2) sat beside him.
Computer: Q is for quilt.

Child (#2) [faced to Child (#3)]: I have a quilt.

Child (#3): I have it too.

Child (#2): now click on S again.

[Child (#3) did.]

Computer: P is for pie, yummy.

Child (#3): yummy.

Child (#2): haha.

Two of them looked each other and smiled. Child (#3) said, “That’s so funny, I want to play again.” Through inter-guiding, child found the fun from the computer activities.

Child (#23) played the program *Arthur* and Child (#21) watched.

Child (#21): drop…did that one [pointed the screen]

[Child (#23) did.]

Child (#21): did that…click on Arthur.

Child (#23): I know, I will.

When they saw D.W. giggled, both of them laughed. Child (#21) shouted, “again, again.” Child (#23) enjoyed to listen and accept his partner’s guidance, and played the funny part three times.

* Asking for help. When the computer controller did not know what or how to do, he or she asked his or her partner for help. Child (#15) played the computer with her partner (#6).
Computer: Where is the cookie jar?

Child (#15): That’s the food. I don’t know where is the cookie jar?”

Computer [continued]: Where is the cookie jar?

Child (#15): “I don’t know. Do you help me?” [She looked at her partner (#6).]

Child (#6) moved the mouse and said, “Here.” He provided the help and directed to solve the problem. Another observation, Child (#16) played the computer with Child (#19).

Child (#16): Oh…. how did you do it? What did you did? I don’t know.

Child (#19) [pointed the screen]: click on here [the button.]

Child (#16) couldn’t control his mouse well. His partner (#19) helped him move the mouse and clicked on the button. Child (#16) tried to click on every button, which the mouse rolled over. Continually,

Child (#19) [pats Child (#16)’s shoulder]: hi, see…look here.

Child (#16) [made a face]: owe, how did you do that? Show me.

Child (#19) controlled the mouse and checked the way they went into. Child (#19) went back to last screen and showed how he did it. Sometimes, the non-verbal action was also a way to provide help.

Sometimes, child not only asked their partners’ help but also sought any help from their teachers.

Child (#9): what’s that? Can you show me what’s that?

Child (#5): I don’t know. You can click on anywhere and try.

[Then Child (#5) left.]
Child (#9) did, but she still didn’t understand and know what did the icon showed on the screen mean. She stood up and yelled, “Angel, Angel, Angel, Katie, Katie. [The teachers’ names]” However, there was no response, because the classroom was too noisy. Child (#9) yelled again. Finally, the teacher came and gave some help but did not give the correct answer directly. The teacher wanted her to do by herself.

One observation was interesting. When Child (#20) played the software with his partner (#23), Child (#20) played and restarted the same game 3 times.

Child (#23): you did it again and again.
Child (#20): I want to find where we want to go.

[Then Child (#20) found the mouse couldn’t work, so he asked his partner’s help.]

Child (#23): ok, give me the mouse and let me try.

The mouse was frozen. Child (#23) tried his best to figure out the problem. He tried to move the mouse and typed on the keyboard, finally he even pulled out the software.

Sometimes, the children’s help did not work to solve the problem. When children got the help that was what they needed, they were happy.

Child (#14): I want to go there. [He couldn’t control the mouse well]
Child (#4): here, I will do for you.

[They played the software Matching Cards.]

Child (#14) pointed one card he wanted to choose. Child (#4) helped him move the mouse to get the right answer. Both of them smile happily. Asking for help as
playing the computer, not only the children who got help felt happy, but also the children who provided help felt happy.

*Aggressing.* When children played computers, they did not always work peacefully. Child (#2) sat in front of the computer alone. Child (#6) came to join with him. Child (#6) found that Child (#2) chose the wrong way, so he tried to grab and control the mouse. Child (#2) said, “Stop it.” He grabbed back the mouse and looked at his partner (#2) angrily. He pushed him (#2) away. The action of grabbing was happened when one child did not accept the other’s direction.

Another observation, when the coloring program was setting, Child (#3) used mouse to click on the color platform to create a picture, at that time Child (#7) came to watch.

Child (#7): put the moon fire.
[Child (#3) colored the moon red.]

Child (#7) [found that was wrong]: let me do. [tried to control the mouse]

Child (#3): no. [grabbed the mouse back]

Child (#7): I say it’s my time. … there…Quit it.

Child (#3) hit his partner (#7)’s head, and said, “Please go away.”

When Children had conflicts with their partners, they performed strongly to express their desire of control. When Child (#11) played the computer and her partner (#4) came to watch.

Child (#4) [pointed the screen and directed her partner]: go to there…go the way there….make it higher….go there….go there….

Child (#11)[hit her partner (#4)’s hand]: I know.
Child (#4) [pointed the stop sign]: go there go there.

Child (#11): no, no, I want to do that later.

Child (#4) used the keyboard to control the arrow and direct the game. When Child (#11) found out, she became very angry. She pushed her partner’s (#4) hand away, and hit her left arm and said, “Stop it.” Child (#4) left frustrated.

From some observations, the action of aggressing was more serious. When Child (#4) played the computer, she asked child (#1) to leave. Child (#1) was very angry, so he scratched Child (#4)’s face. She cried sadly. There was a mark on her face. She kept crying, and said, “I want my mom.” Child (#1) used his fingers to prick child (#4)’s head, and then left disappointed. Both of them were cry. Teachers came and dealt with the dispute.

Another observation, when two Child (#4 and #11) played the computer, the third child (#13) wanted to join. Child (#11) said, “Only two kids can play, no, no, you go away.” Child (#13) wanted to say something, but other two Child stopped him to say. Child (#4) kept asking everybody to leave. Child (#13) was very angry and suddenly pulled child (#11)’s hair. Child (#11) cried hardly. Other kids in the classroom came to see what’s happen. Teachers stopped Child (#13)’s action. They also asked other kids to leave there.

Children’s action of aggressing is a violent behavior occurred in peer interaction. Fortunately, when the events of aggressing happened, Children could control themselves and obeyed their teachers’ rules and directions. They cool down quickly and played with their peers again peacefully.

**Defending control.** When some children encountered aggression, they adopted methods to defense and protect themselves. Child (#16) played the computer and
Child (#19) watched beside him. When both boys saw the funny pictures they made before, they laughed. Child (#19) tried to knock the keyboard, but Child (#16) pushed his partner (#19)’s hands away and said, “No.” He kept trying different colors and styles of hair for the characters on the screen. He did what he wanted, and did not care about his partner’s (#19) suggestions.

Some children did not compromise with their partners and strongly presented what they wanted. Thus, when disagreement, quarrelling, argument, and squabble happened, children always considered what they wanted. They seldom said sorry to their partners. Child (#10) played the computer and Child (#14) sat beside him. Child (#14) found Child (#10) didn’t click the way he wanted, so he tried to grab and control the mouse. However, Child (#10) grabbed the mouse back and held it tightly to avoid losing again.

Another observation, when the timer alarmed, Child (#5)’s turn was over. But, the game was not finished. Child (#5) asked, “Can I turn to watch?” Two kids changed seats. But, Child (#5) still wanted to control the mouse. She pointed the screen and said, “just don’t touch that…no… Oooops, No! …” Her partner (#1) said, “It’s my turn. … Ok! Give you one minute. Only one minute.” Her kindness not only made her partner (#5) happy but also played the game together happily and peacefully.

Some children’s actions of defending were violent, but some were gentle. Most of quarrels happened when children wanted to control the computer mouse and presented what they wanted to show.

Ignoring. Some children’s attitude was passive when their partners interrupted in the activities. Sometimes, they ignored their partners’ guidance and aggression. One observation was presented.
Child (#24) [pointed the screen]: there is the spot.

[Child (#4) had no response.]

Child (#24): I want to play that one. [Tried to grab the mouse and keyboard]

[Child (#4) still ignored him.]

Child (#16): you got this…. Oh…Buster….coming (pointed the screen)

that, that, that….

[Child (#15) ignored what he said. They went back to silence again.]

Child (#15) is a girl, and Child (#16) is a boy. After the activity, Child (#15)
kept to say, “I do not like the boy’s way.”

Some children’s passive attitudes were presented by body languages. Child
(#2) played the computer and Child (#1) sat beside him.

Computer: snake.

Child (#1): snake.

Child (#2): hiss…. [Sounded very loudly]

Child (#1) [covered his ears by his hands]: Stop.

Child (#2) pointed the screen, but he found that Child (#1) did not care about
him, and then he left.

In another observation, Child (#4) played the computer and Child (#15) watched.

They did not talk for a long while [about 6 minutes].

Child (#15): turn…and ...walk.
[Child (#4) did not mind what her partner (#15) said. She tried to click everything she wanted.]

Child (#15) [Stood up and pointed the screen]: That one… Try it.”

Child (#4) pushed his hand away, smiled to him, and ignored him to focus on her doing without saying.

Sharing control. Some children shared their experiences with their partners including computer skills, learning skills, and knowledge. When Child (#2) played the computer and Child (#6) sat beside him. In the game, there was a teacher who asked questions, and there were three answers provided for child to choose. Child (#2) said, “What’s this?” Child (#6) played this program before and knew the answers of most of the questions. When Child (#2) was confused, his partner (#6) jumped in and controlled the mouse to help him find the correct answers.

When Child (#14) played the program with Child (#25). Child (#14) got through the game quickly and seemed to be very familiar with it. Child (#25) could not keep up with his speed.


Child (#14): That’s easy. I played it several time.

Child (#25): Wow! Can you show me?

Child (#14): Sure! Look!

If children chose the program or software that they knew very well, they would like to show how successful or great they were. In some observations, they would like to present and share their prior experiences.
Sometimes, computer skills influenced children’s computer activities. When Child (#24) played the computer and Child (#4) sat to watch.

Child (#24): I want to go there. [He couldn’t control the mouse well]
Child (#4) [moved the mouse]: here, I will do for you.
[Child (#4) returned the mouse back to her partner (#24).]
Child (#24): Again. See, the mouse cannot work.
[Child (#4) knocked the mouse.]
Child (#4): Ok!
Child (#24): Yah! Cool!

From the observations, if one child had more knowledge about the content of the software than the other, he or she liked to share his or her knowledge control. If the watcher had more computer skills and experiences than the controller, the controller would accept the help or release the mouse-control to his or her partner.

*Showing pleasure.* Some children liked to show pleasure with their partners. When Child (#2) played the software with Child (#6). Child (#2) turned the volume of speaker louder; he and his partner looked each other with smile because the music was so funny. Child (#2) waved his body when he heard the music. While they finished all the games, Child (#2) raised his right arm and said, “Yah! Yah! ” Child (#6) said, “Click on the sign again.” When the music was played again with an animation that was a bomb hitting on a dragon, two of them laughed.

When children had successful experiences of playing the computer with their partners, they show their pleasure. Child (#9) drew a picture on the computer
program. When she drew a purple line successful, she said, “Yes!” and smiled to her partner.

When Child (#3) and Child (#7) played the computer together,

Child (#3): click on different thing…that’s awesome…that’s nice.

Child (#7): you are that one. I am this. …[pointed the screen]

Child (#3): no, that’s a girl…no, funny sword…[pointed the screen] that.

Child (#7): she [the character] does too many…I want to put some on the window.

When they completed the task, which the computer game gave, both of them danced with the music on the chairs.

When children showed their successful pleasure, they loved to share with others. Sometimes, the feedback from their teachers or peers encouraged them to play the game again. When Child (#9) finished the coloring program, she played again because she got every thing right. She yelled happily, “I win, I win.” She played high five with one teacher when the teacher said, “good job!”

Sometimes, one child’s emotion of pleasure influenced the other’s emotion. When Child (#4) used the computer and Child (#10) sat beside her. Child (#4) looked like very happy. She sucked her thumb and waved her body with the music from the computer. Child (#4) turned her head to look at her partner (#10) and said, “Hi, look at me, I win.” Her partner said, “Yah! Yah! We win. We win.” Two of them hugged together and waved their arms and body to sing with the music.
The content of the program or software influenced children’s interests and motivations. When Child (#11) played with Child (#10). Child (#11) waved her body when she heard the rhymes from the program.

Child (#11): I like the music.
Child (#10): Me too.

When the timer alarmed, child (#11)’s turn was over. Child (#10) played the program again and waved his body and stomped his feet with the music. Child (#11) came back and looked at Child (#10)’s doing. They enjoyed happily.

Showing displeasure. However, not every child showed pleasure when he or she played the computer with his or her partner. Not every time when children played the computer with their partner, they had experience of pleasure. Child (#14) played the computer with his partner (#24). When the timer alarmed, child (#14) stood up, felt angry, and said, “rats!” to his partner. He argued with teachers and asked more time to finish his game.

Sometimes, children presented their displeasure when they negotiated with their partners. Child (#6) played the computer and Child (#2) watched beside him. When the timer alarmed, two boys changed their seats.

Child (#2): my turn, my turn.
Child (#6): ok, ok. It’s my turn to watch.

Child (#2) [sat on two chairs]: I want to play computer. Get out of here.

Child (#6): I can stay to watch.

Child (#2) [yelled]: no, my turn. [Child (#6) left angrily]

[When Child (#2) was asked to get his smear sunscreen, he left his chair.]
[Child (#6) came back and sat down quickly.]

Child (#2): No. I save the chair for Child (#8), please go away.

[Child (#6) left disappointed.]

Children’s displeasure affected their social interaction with peers. Fortunately, from the observation, there was no displeasure to break children’s friendship.

*Play alone.* Sometimes, children had no partner to play computer. They played alone. Child (#13) played alone about 3 minutes. She did not know what the exit sign was for. Then she clicked on that button. She looked around there was no teacher nearby. She touched and clicked on everything she saw, and suddenly the screen disappeared. She turned back to talk to the observer and said, “I don’t want to see anymore.” And then she left.

Another observation, when Child (#9) played the software alone. One teacher sat beside her and did not say anything.

[About 5 minutes later]

Child (#9): Look at me.

Teacher: Mmmm…That’s good.


[Teacher looked around and asked Child (#4) weather wanted to sit with Child (#9), but she did not.]

Child (#9): I do not want to play more. [She stood up and left.]

Most of children liked to play the computer with partners. Although they had chance to play alone, they did not play for a long time. Child (#2) played computer alone. She spent 6 minutes and then left. She was one who spent the longest time to
play the computer alone in the observations. Other observations, the time for the event of playing the computer alone was less than 6 minutes.

Based on the researcher’s observations, when children played the computers alone, teachers asked them whether they needed partners companied with them. Teachers respected children and their decisions. However, from the teacher interviews, most of the teachers wanted children playing the computer with partners. One teacher replied,

It is nature that children play with partners. We do not motivate that children have to find partners or help them organize group setting to play the computer. Even if children do not have partners to play the computer together, they might feel boring and then leave, or look around to ask someone to play together. The teacher emphasized that children liked to play with partners. Although computer program or software were attractive them to involve in the games or scenario, children liked to share what they did with the real persons such as their partners, teachers, or parents, rather than the computers.

Child (#11) played the software *Chicka Chicka Boom Boom* alone. Two minutes later, she had clicked on several buttons and looked like very excited because she did very well. She looked around and found no one paying attention to her. She stood up and turned the volume louder. Then, other children looked at her. She smiled with a little bit pride about what she did. One teacher came and asked,

Teacher: what are you doing?

Child (#11): I got it…I win…I win. [She asked the teacher to sit and looked what she did.]

Teacher: why did you turn the volume so loud?
[Child (#4) came and sat beside Child (#11).]

Child (#4): See. I liked this… [Child (#11) joined and pointed the screen with her fingers.]

[The teacher tuned down the voice and left.]

[Child (#11) and Child (#4) laughed a lot at the computer location.]

Child (#11) played the computer alone at the beginning. She wanted someone to share and enjoyed with what she did. Child (#4) came to join and discuss together. Child (#11) did not isolate herself and wanted other classmates to pay attention to her. Finally, she found a partner and not played alone.

The Impact of Gender and Age

Based on the observations and interviews, the researcher coded and analyzed to categorize four themes about the impact of gender and age including same age, different age, same gender, and different gender.

Age. Randomly, children chose partners to play the computer together. Sometime, two kids played together and were the same age. When the same age [3 years old] two kids Child (#4) and Child (#7) played the computer together, they focused on what they did and silent.

Child (#7): Yes…that…

Child (#4): Hisssssh…

[Child (#7) stopped talking and just watched the screen.]

When the same age [5 years old] two kids Child (#2) and Child (#6) played the computer together, they discussed and had more interactions.

Child (#6) found that her partner Child (#2) chose the wrong way, so he tried to grab and move the mouse Child (#2) held.]
Child (#2): Stop it. [He grabbed back the mouse and looked at his partner angrily.]

[Child (#6) didn’t say anything but still watched.]

Child (#6): Wrong, click on this… [He tried to guide his partner.]

Child (#2): I know. I know.

Child (#6): Do it.

[Child (#2) followed his partner’s guidance.]

[Finally, they completed the task and won the game happily.]

These two kids played the computer together with lots of interactions. Both of them had plenty of computer skills and experience. They were very familiar to the software. Child (#6) sat beside her partner when they played. She really knew what and how to play.

Sometimes, children and their partners were different age and played the computer together. Two children were at different age group. Child (#3) was three years old and Child (#6) was five years old. Child (#3) played the software Blue’s Clue and colored a picture. Child (#3) colored every small part with the same color and moved the mouse slowly. Child (#6) felt boring because her partner Child (#3) colored the same picture more than two minutes.

Child (#6): a horn violet…everything purple…oh, everything purple, everything purple? Then everything blue? Sorry, you already had turn…click here, and here.

Child (#3): Oh…Oh…

[Child (#3) did what his partner said. The screen jumped to another game.]

[The timer alarmed. Child (#3) left. Child (#6) switched to play the computer and child.

(#12) joined. Child (#12) was five years old too.]
Another observation, Child (#13) was three years old and Child (#10) was four years old. They played the software *Chicka Chicka Boom Boom* together.

Child (#13): I want to click on the D.
Child (#10): I want to click on the F.
Child (#13): I am first. That’s my turn.
Child (#10): click on that…quick…[He tried to grab the mouse and controlled it.]
Child (#13): Hi…my turn…my turn…
[Child (#10) pushed his partner’s body to take back the mouse and yelled to him.]
[One teacher came and asked them to cool down.]

Sometimes, when different age children played the computer together, they helped and had fun with each other. Child (#10) was four years old and Child (#14) was five years old.

Child (#14) [pointed the screen]: click on A twice.
[Child (#10) did.]
Child (#14): again. [Clicked on A twice again.]
Child (#10): haha…that’s fun.
Child (#14): haaa…now play X.
[When they saw the animations pup up, both of them laughed a lot.]

Another observation, Child (#18) was five years old and Child (#21) was three years old. Child (#18) played alone and 4 minutes later, Child (#21) came to sit down. They had no talk in the beginning of the game.
Child (#21) [pointed the screen]: click on that.

Child (#18): Ok.

Child (#21) [pointed the screen again]: click that, click that. [Then jump away happily.]

[Child (#18) did what Clare’s suggestion.]

Child (#18): You want to try?

Child (#21): Yeh!

[Child (#21) controlled the mouse and clicked one button. He was so happy.]

[Child (#21) returned the mouse and Child (#18) finished his works until the timer alarmed.]

Based on the observations, children developed individual social interactions by their ages. In this study, the events of peer interactions were divided into the-same-aged and mix-aged groups. The researcher focused the impact of age on each type of peer interaction.

*Gender.* Randomly, children chose partners to play the computers together. They played with either same gender or different gender.

Based on the observation, children did not have preference to choose partners’ gender. They randomly and voluntarily played the computers with partners. If the spot was empty, anyone had the chance to sit and play. There was no complaint about choosing partner’s gender.

Based on the observation, both girls and boys like to play the computer. Girls’ performance was the same as boys’ performance. One teacher replied, When they played the computer with partners, they do so well. There is no stereotype such as boys’ technological skills are better than girls. Boys and girls do like to play the computer with partners.
The researcher focused the impact of gender on each type of peer interaction. The gender was a consider factor to examine children’s peer interactions when they played the computer with partners.

*The Limits of Settings*

The limits of settings were factors to influence children playing the computer with partners in preschool classrooms. Based on the data analyzing, the researcher pointed out three topics to describe including time limits, computer settings, and teacher’s roles.

*Time limits.* The classroom rule for using computer is everyone can only play 10 minutes. When the time was up, children switched and reset the time. Most of time, teachers set the time for children. There was a timer located beside the computer. When the timer alarmed, children knew the time was up.

When Child (#9) started to play the software with Child (#6), a teacher stood behind them.

Child (#9): Can we start?

Teacher: Yes, you can and you guys have ten minutes. [Set the timer]

Child (#6): Ten minutes later, that’s my turn.

Child (#9): Ok.

Most of children followed the rule. The teacher helped them keep the order and the condition when they played the computer together. When Child (#17) played the computer with Child (#20), the timer alarmed. Child (#17) stood up and left.

Child (#20) [changed seats]: My turn. [Child (#18) joined and sat beside Child (#20)]
Child (#20): Teacher, Teacher.

[A teacher came.]

Child (#20): Could you set the timer?

Teacher: yes, sure.

However, not every child felt happy when the timer alarmed. When Child (#5) played computer, Child (#11) sat beside him and Child (#7) wanted to join and watch. Child (#5) used the mouse to play the remote-controlled helicopter.

Child (#11): oh…oh…we got there…hi…where are you go …oh…ha…got out there…o---h…owe…don’t go.

[Child (#5) and Child (#7) smiled.]

[The timer alarmed]

[Child (#5) stood up, hit the wall, and left angrily.]

When Child (#21) and Child (#19) played the computer together, one teacher came.

Teacher: No one set your time?


Teacher: Give you 5 more minutes.

Child (#21): No fair.

The researcher also found that the timer was equipment that some children didn’t like. It did not control children’s behavior. Child (#2) did not ask teachers to set the timer. His playing time was more than 15 minutes. One teacher found the timer did not set, so she set it up at 4 minutes. When the timer alarmed, Child (#2) stood up and
changed chair. He knew there was nobody noticing him; he kept controlling the
mouse and exploring different games about 4 more minutes.

Teacher: how are you still sitting here?

Child (#2) [felt angry and argued]: you just give me 4 minutes. I haven’t done
yet.

Teacher [tried to comfort him]: would you mind help me put these puzzle back?

[But he ran away.]

Another observation, Child (#8) played the computer alone. When the timer
alarmed, she reset the timer to 5 more minutes. When one teacher came, she stopped
her playing.

Child (#8): I didn’t finish.

Teacher: no, your time is out.

Child (#8) screamed and cried harder and harder. She pushed the teacher’s body.
The teacher took her away for cooling down.

Most of time, when children played the computer with partners, partners played
the role of monitoring to control the time. Based on the observations, the time limit
was very important for children to follow the rule and develop their peer interactions.

Computer settings. For computer settings, there was one computer set up in each
preschool classroom. In Room 213, the computer was located inside the classroom. In
Rooms 205 and 219, the computers were located outside the classroom, in the
hallway. The settings were attractive for children to play at the free-choice time.

Based on the observations, most of the events happened at Room 213 where the
computer was located inside classroom.
One of teachers of Room 213 replied,

Computer setting is one of daily activities at the free-choice time. Children are volunteer and free to choice the activity of playing computer at the free-choice time. The computer is set up inside classroom. Children will have more chance and motivation to access and play. Most of children chose their free-choice activities in the classroom. If the computer was set up outside classroom, children had less chance to use it.

One teacher of Room 219 indicated,

Because inside classroom there is no appropriate place to set up the computer, our computer is set up outside classroom. In order to encourage children to use the computer, we have a name board to let any one who wants to play the computer to sign his or her name up.

One teacher of Room 205 responded,

Our computer is located outside classroom. We have no any design for children to use and play computer. Children are free to select any activities including inside or outside classroom setting. Therefore, there is no limitation for children to use and play the computer.

Based on the observations, for outside classroom computer settings, the events of playing alone were less than the events of playing with partner. The researcher found that children who wanted to play the computer located outside classroom invited their partners went together. Moreover, for outside classroom computer settings, when children played with partners, they came together and left together most of time. These events were different from the events that happened inside classroom computer settings where children continued to use and play the computer if the spot was empty.
Teacher’s roles. Because using computers was one of the classroom activities for preschool children at this center, preschool teachers designed the activities at free-choice time for children selecting. Teachers played a helper role to facilitate children when they needed.

One teacher replied,

When children with their partners used the computer, they learned and played together. When the activities processed, their interaction developed. They learned how to share and how to cooperate each other. This teacher indicated that playing computer provided the opportunity to develop children’s peer interactions.

Another teacher also added,

Playing computers with partners allows children not only to motivate learning computer but also to develop social skills such as sharing, observing, monitoring, cooperating, modeling, negotiating, etc.

One teacher responded,

When children play the computer with partners, we do not bother them unless they really need our help. For example, the computer is frozen; the timer needs to be set or reset; the program needs to be changed, and so on. For children’s interaction, we let them to deal with first. If they cannot handle, we interrupt and arbitrate.

Teacher’s attitude was important for the development of peer interactions. One teacher mentioned that the more teachers involved, the more children depended. He continued,

For preschoolers, how to share and how to self-control are difficult to learn. The computer program or software is so attractive that every child
wants to sit in the front of the screen and control the mouse. At this age, children want to show what they do and share what they want with their partners. Any interactions like conflicts, fights, and disputes are normal conditions. If teachers involve in the situations too much, children are hard to learn and handle by themselves. We need watch carefully and at the right moment give appropriate help and needs.

Teachers also need technological skills and are familiar with operating computers. One teacher replied,

Teachers need increase their computer self-efficacy and motivation for design computer activities. With computer used extended and broad, computer setting, curricular and instructional designs in preschool classrooms are inevitable. Using computers to learn and play for preschooler is one important part of school learning life, especially for their development of social interaction. So, teachers need pay more attention about the computer activities and increase their own technology knowledge and background.

Based on the interviews, teachers participating in the study agreed that playing computers with partners provided the opportunity for preschoolers to develop peer interactions. They also consisted that they were a helper and a consoler when children really needed.

Summary

This chapter reported children observations and the meaning teachers gave in exploring peer interactions at the computer in preschool classroom. The researcher examined the patterns of children-children interactions, children-computer
interactions, and children-teacher interactions during their free play in the mixed-age and mixed-gender classrooms.

Children in preschool playing the computer with partners developed their peer interactions. The researcher coded and analyzed the data to categorize ten types of peer interactions. There was accepting guidance, asking for help, aggressing, defending control, ignoring, and directing partner’s action, sharing control, showing pleasure, showing displeasure, and playing alone.

From teacher interviewing, the factors of age and gender influenced children playing the computer with partners. Through the analyzing of same age, different age, same gender, and different gender, the researchers had opportunity to know more about children’s peer actions.

The settings were important for kids paying the computer with partners in preschool environment. The researcher explored the impacts of limits by time limits, computer settings, and teacher’s roles.
CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter concludes and relates the findings to existing literature. The chapter also discusses the implications of the study and suggests future areas for research. The study was conducted at a University laboratory. Children did daily classroom free-choice activities, which made them have free opportunities to select what they wanted to do. Using the computer was one of the classroom activities. Children randomly selected their partners to use the computer together.

The study was conducted in the Spring Quarter, 2004. After the observations, the teachers participating in the study were interviewed at the end of the Quarter to better understand their feelings from their opinions and attitudes about children using the computer and their involved experiences.

The observational field notes and the transcriptions of interviewing were main data to be analyzed using a context analysis procedure to delineate themes that emerged from the peer interactions the children had at the computers.

Results and Conclusions

This section describes three parts related to the results and conclusions of the study. There are (a) the types of peer interactions, (b) age, gender, and peer interactions, and (c) environmental settings and peer interaction.

The Types of Peer Interactions

Directing partner’s actions was the most frequently occurring peer interaction pattern. The researcher divided directing partner’s actions into two categorizations. One was cooperation, and the other was conflict. Directing other’s actions was exhibited in relation to their partner regardless of who was in control of the mouse or not.
**Cooperation.** The patterns of cooperative interactions exhibited by preschool children while engaging cooperatively with the computer were accepting guidance, asking for help, sharing control, and showing pleasure.

Most of time, the controllers accepted their partners’ guidance easily and happily. They enjoyed the guidance and help from their partners. During the interactions, partners with different competences provided each other with skilled assistance that reached other’s ZPD (Vygotsky, 1978). For teachers, they need to know the children’s computer background and competences, and then they can urge children in one group with different competences.

When children felt frustrated to control the computer, they did not hesitate to ask questions to their partners or teachers. Younger children asked for help more frequently than older children. Through this interaction, children worked cooperatively. The children who asked help learned the skills of communication and gained the knowledge they needed. The children who offered help learned solving problems and managing the groups.

The majority of children shared controlling with their partners positively, especially, the partners they played with frequently. When their partners had more computer skills, learning skills, and knowledge, most of the children released their powers of control and enjoyed working with their partners together.

Children in this study showed their pleasure for some reasons, such as winning a game, completing a task with a partner, and getting the funny animations or songs. Young children were more satisfied when working with partners than when working alone. They expressed their pleasure easily when using the computers with partners (Perlmutter et al., 1989). It may be evidence that a mixed-age classroom is a better
environment for preschool children to develop their social abilities when they are using the computers.

Conflict. According to Campbell et al. (1999), conflict was viewed as a challenge that taught children positive and constructive ways to express disagreement. Through analyzing the data, the researcher discovered children-partner conflict styles and what situation they developed when they played the computers with partners. The styles and situations were aggressing, defending control, ignoring, and showing displeasure.

Most of the conflicts in preschool classrooms were rather brief (Vespo & Pedersen, 1995). In this study, younger children directed most of the events of aggressing. They showed slightly more negative emotions than did older children when using the computers (Shade, 1994). However, after the interaction of aggressing, generally the children controlled themselves and made peace with their partners again. Teachers need to be good moderators to deal with children’s conflicts. Unless any stronger aggressing occurs, such as pulling hair, scratching face, or biting, teachers are not necessary to interrupt.

Some children did not agree with their partners and strongly presented what they wanted. Thus, when disagreement, quarrelling, argument, and squabble occurred, children rejected against their partners’ help or control. Teachers should have a chance to let them talk to each other and require them to listen to their partners’ words.

However, several events in this study showed that children ignored their partners’ instructions and behaviors. Most of time, older children cared less about the opinions of their younger partners than younger children did. The older children paid more attention and respect to their same or older-aged partners.
In this study younger children showed displeasure more frequently than their older peers. Most of the younger children were usually egocentric and did not control their anger. Sometimes, they easily lost their temper for some reasons, such as turn taking, limited time, and not controlling the mouse well. Fortunately, displeasures in the preschool classrooms were brief and disappeared quickly.

Age, Gender, and Peer Interactions

In the observational notes, the researcher found little evidence of gender differences in the peer interactions of computer use. Boys were not observed to be more dominant than girls. Most of the boys and girls had technological skills and experience, which helped them solve problems by themselves easily. Moreover, girls were generally just as interested as boys in using the computer. It may be concluded that preschool is a good time to introduce computers to children (Clements, 1987; Bergin, 1993), because by the time they are of public school age, there are already large gender differences in computer interest, computer self-efficiency, and actual computer use (Morrison, 2001; Bhargava et al., 1999).

A somewhat surprising finding was that there was little evidence of gender differences in teacher treatment of boys and girls. The teachers in study seldom spent the whole time with the children in using the computers. They would come if the children asked for help, such as changing CDs or setting the timer. The children in this study, regardless of their sex, successfully activated computers, used mice fearlessly, knew their way around the keyboard and enjoyed computer games. Few of them needed technological help from the teachers. From this viewpoint, preschool is a good time to introduce children to use computers because children are ready to accept the new technology in their real lives.
The findings suggest that children prefer to interact with different aged peers who can offer more stimulation and opportunities to children’s social development. Feedback from the teachers who were interviewed in this study indicated that age issue was not a problem that influenced peer interactions in using the computers. The preschoolers, from 3 to 5 years old, enjoyed interacting with their different aged partners. The younger children especially preferred to use the computer with older partners who have more competence and are viewed as ideal models for facilitating cognitive and behavioral development. However, conflicts often happened in the mixed-age groups. Sometimes younger children cannot control their emotions and time management. On the other hand, older children have more language and technological skills. They have better social cognition to negotiate with partners and solve problems. Like Vespo and Pedersen’s (1995) observation in preschool classrooms, the researcher found in this study that older children use more verbal behaviors, such as asking for help or for extended time, than younger children.

Although the age in preschool from 3 to 5 was a big range, the researcher found that a mix-aged classroom could develop children’s peer interactions diversely. By creating the interacting environment, children learned how to respect and accept each other within different or same ages.

**Environmental Settings and Peer Interaction**

The study showed that some limits influenced children’s development of peer interactions when they played on the computer with partners. There were time limits, computer settings, and teacher’s roles.

When children played on the computers with partners, the time limit not only provided them to obey the classroom rules, but also helped them to make the time
management with partners. The timer was used to remind children of the time setting and to monitor children to take turns fairly.

In most cases, children knew the time limit (10 minutes each child) was a classroom rule when they used the computer. Not every child felt happy when the time was up. Some children yelled to their partners or teachers. Some left angrily. Playing on the computer was so interesting and attractive that children would sometimes disobey the rules and have conflicts with partners or teachers because they wanted more time and chance to use the computers. The researcher found some young children (3 years old) behaved more emotionally. When the time was up, they cried and yelled. Some of the older children (4 or 5 years old) looked around when the time was up. If no one noticed, he or she tried to continue playing without reporting to partners or teachers.

Time limits provided children opportunities to follow the time rule and to develop peer interactions with partners. Teachers could give children rights to discuss and decide how much time they played and switched. Through setting the time, children learned how to organize and manage the playing time and negotiate with their partners.

Computer settings influenced children’s peer interactions when they used the computers with partners. The study showed that there were significant differences when the computers were set up inside classrooms or outside classrooms. Children preferred to use the computers inside the classroom because they felt more invited. Moreover, children liked to show and share what they did with their partners or teachers. They wanted more classmates paying attention to their doings. When children used the computers outside the classroom, they liked to invite partners to join with them. Children did not isolate themselves for a long time. If they played the
computers alone outside the classroom, most of them only played for a short time and left.

Teachers were helpers or counselors for children when children used the computers with partners. However, teachers did not get involved too much when children had problems when using the computers with partners. Teachers provided appropriate help when children really needed it. Using the computers made children deal with problems such as conflicts, disputes, and even fights, or positive interactions such as cooperating, sharing, modeling, and observing. Teachers gave children some suggestions and advise to solve the problems by themselves. For example, the teacher helped intervene in the children’s conflicts with partners, but reinforced the idea that the children needed to listen to each other and to try to work things out on their own. Teachers’ roles influenced children’s development of peer interactions. Children needed to become more independent to handle their interactions with peers.

Recommendations

The teacher’s role was the important finding in the study. A teacher not only takes care of the children’s school life, but also notices children’s development of social interactions, especially their peer interactions. A teacher should shift his or her role to be a helper or a counselor when children used the computers with partners. Teachers should let children feel free to ask any questions when they need to. Moreover, a teacher should set a computer environment and provide activities for children to use the computers with partners. With computers used widely and broadly, computers should be set up for curricular and instructional designs. Children in preschools should get access to use and use computers appropriately and conveniently.
In this study, teacher presence was a less important factor when children were using computers with their partners. Most of the children preferred to use computers with partners rather than teachers. However, teachers did play a role to some degree in successful computer usage. They also gave children more confidence to explore the computers. Therefore, teachers should pay more attention and be involved in meaningful communication with children, especially young children who lack technological and social skills. Teachers also need to help children relate the thinking processes used in the computer program to other school activities and real life.

To learn cooperative skills, children need social experiences and social interactions. Developing children engaged in cooperative experiences and interactions while using the computers with partners. Teachers need to create an appropriate environment for encouraging children to accept guidance, freely ask for help, share control, and show pleasure. If teachers found children using computers without talking, they needed to get involved in such situations by asking a question or giving a hint to make children discuss or figure something out together. The more interactions, the more cooperation they learned. Therefore, when children use the computers alone, teachers should suggest them to invite other partners to join.

Conflicts are common among children’s interactions while using computers with partners. Given the right and appropriate directions, children can learn how to resolve their own conflicts. Teachers need to be careful about the right moment they intervene and the right method they adopt. Teachers can better empower children by teaching them conflict resolution strategies. First, teachers need to know what the causes of conflicts are. For example, are individual needs not being met? Is power inequitably distributed? Did the child not sleep well last night or do they need a snack? Is communication ineffective or nonsense? From these questions, they discover
children’s personal conflict styles. For instance, they are aggressive, passive, or ignorant. Finally, teachers analyze children’s styles to develop strategies to enhance management of conflict situations. For passive children, teachers need to encourage them to express their feelings and make them bravely communicate with partners. For aggressive children, teachers need to separate them to calm them down and tell them to present their anger in words. For children who ignore in conflicts, teachers need to remind them to not neglect their partners’ feelings. Hence, teachers have a central role to play in conflict process and solution.

Teachers need to provide suggestions and advise to children about how to deal with conflict with peers. Children need to learn how to get along with partners politely. For example, they should say words such as “thank you,” “excuse me,” “please,” and “may I…” when they communicate with partners. Children also need to learn how to control their emotions, for instance, taking a deep breath, calling teachers for help, or just walking away.

In the study, the issue of gender did not influence children’s computer usage. Girls like to use computers as much as boys. Teachers need to offer an equalized environment for children using computers. For example, choosing software should avoid too girl-oriented or boy-oriented programs. Mixed-gender partnerships led to greater peer interactions. Teachers should take advantage of this opportunity for fostering mixed-gender cooperative learning behaviors such as sharing ideas and problem solving.

Most of the peer interactions happened in the different gender groups. Preschool-age boys engaged in more body contact and preferred expressing their feelings and emotions by verbal and physical fighting more than girls did. For example, the boys
tended to affirm their dominance, use commands and treats, and show off to their partners. Teachers need to remind them to treat their partners gently and politely.

Most conflicts occur in same-gender dyads (Alexander & Hines, 1994). The boy-boy groups created more conflicts than the girl-girl groups. The girls in the girl-girl groups offered and required more help than boys in the boy-boy groups. Teachers should teach boys how to use self-control. Also, teachers need to ask boys to observe their partners’ behaviors and imitate them.

For the issue of age, the young children used more non-verbal actions than the older children while using computers with partners such as pulling hairs, scratching, pushing, yelling, crying, or shouting. Those emotional behaviors sometimes affected peer interactions. Children should be taught how to cool down and control their own emotions and behaviors. Teachers should help them learn self-control and communicative strategies. For older children, teachers should provide opportunities to improve their verbal abilities by asking questions, offering help, discussing, negotiating, and sharing ideas.

In this study, children used the computers with partners without any arrangement. However, by observing each other, the same-age group settings offered opportunities to make the same-age children simulate each other’s mental and physical development, language, emotion, cognition, intelligence, and experience. Teachers should consider or provide an appropriate environment for same-age children to engage in and solve cognitive conflict with partners who are more likely to be equal in knowledge, skill, competence, behavior, and power.

In different-age peer interactions, interacting with older, more competent children is viewed as an ideal model for helping cognitive and behavioral development. Teachers need to take advantage of this opportunity to guide young
children to accept guidance and direction. Also, teachers could provide older children practice in developing their personal self-regulatory and leadership skills. Regardless of same-age groups or different-age groups, when children are using the computers with partners, teachers should provide an appropriate environment and situation to let children face peer interactions such as communication in age gap, modeling simulation, and different attitudes, powers, and interests in dealing with conflicts.

The time limit inhibits peer interactions. It is a necessary mechanism that children follow the classroom rules and control their playing time. However, the data indicated that some children showed displeasure or aggression with the time limit. Some children wanted to continue the game or program when the timer went off. Their partner or teacher asked them to leave or exchange seats. Children sometimes had such difficulty in handling their emotions at that moment that they cried, yelled, or were even aggressive to someone. In order to teach children how to control their behaviors and manage the time setting, teachers could find the appropriate opportunity to allow children by themselves to decide and set the time for using computers with partners. For example, teachers could help children manage the time schedule for computer activities and empower children to arrange the order and time limit by themselves. Through this learning experience, children not only get to have more fun but also learn socialization.

Some peer interactions occurred when the timer alarmed. Some data presented that children had good friendships and cooperative process with partners, but they fought or argued when the time was up. Children were not easy to stop doing the things they were interested and engaged in. Hence, teachers should keep a neutral attitude and arbitrate at the right moment when a fight and argument happen. For example, teachers should announce the classroom rules before the computer activities
start. Or, teachers could negotiate with children to set the time to use the computer. Children need to learn and experience the social orders and rules starting in preschool life.

Setting computers inside classrooms provides more opportunities to develop peer interactions than outside classrooms. In the study, the majority of peer interactions happened inside classrooms. When designing the computer area, teachers need to consider whether children can access it easily and appropriately. A safe, bright, and attractive computer area will simulate children using computers more.

The quality and quantity of computers are important issues that teachers and administrators should consider. The slow processing made children feel impatient. When the computer froze frequently and the mouse operated insensitively, it always made children feel frustrated and even give up using the computer. Teachers and administrators should update computers as needed and check the functions often. They also should have the knowledge and skills about the computer and have competence to solve the problems for children.

In addition, a teacher should be able to understand and control areas of activity, time and schedule managements, and polices/rules for computer settings and the development of peer interactions. From the data, the researcher found that preschool children used computers fearlessly. Teachers should not focus on playing games. They need to design appropriate and meaningful computer tasks for children such as creating electronic storybooks, picture journals, Internet searching, and language learning. Moreover, some technological skills such as using a scanner, digital camera, digital camcorder, and photo editor are useful and helpful for teachers to integrate them into activity designs. Hence, teachers need to improve their own
computer skills and literacy and learn more new technologies from taking some classes or in-service trainings.

**Future Research**

For future research, children’s self-efficacy should be an issue for children using computers about their computer skills, beliefs, interests, motivation, and confidence. Children should be interacting with their peers, teachers, or family members. An interesting issue is to examine the relationship between children’s computer self-efficacy and their peer interactions, and to investigate the influence of peer interactions when children have different levels of computer self-efficacy.

In addition, the computer activity should not be only a choice for children at the free-choice time. If preschool administrators or teachers can integrate computers into curriculum and instruction designs, children can learn more than just playing games. When computers are set for multi-faceted uses, there are more opportunities for children to develop their peer interactions. Furthermore, it is recommended that future research should be conducted with children from different cultural backgrounds in order to establish what they perceive as being culturally appropriate in computer settings. The educators can find more interesting issues or topics to research in these study fields.
REFERENCES


Busch, T. (1996). Gender, group composition, cooperation, and self-efficacy in


[www.allianceforchildhood.net/projects/computers/computers_reports.htm](http://www.allianceforchildhood.net/projects/computers/computers_reports.htm)


kindergarten, with or without adult mediation; effects on children’s cognitive performance and behavior. *Computers in Human Behavior*, 16, 591-608.


National Association for the Education of Young Children (1996). NAEYC position statement: Technology and young children- ages three through eight. *Young


http://www.mff.org/edtech/article.taf?_function=detail&Content_uid1=106


Vespo, J. E. & Pedersen, J. (1995). Young children’s conflicts with peers and


APPENDIX A
Ohio University Human Subject Consent Form

Title of Research: Peer Interaction Associated with Computer Use of Preschool Children

Principal Investigator: I-Chen Hsu, graduate student.

Department: Early Childhood Education

Federal and university regulations require signed consent for participation in research involving human subjects. After reading the statements below, please indicate your consent by signing this form.

Explanation of Study

This study is to investigate peer interaction associated with computer use of preschool children. Due to limited number of computers in the classroom, young children will share computer with their peers. The researcher will examine the patterns of child-child interactions and child-computer interactions during the free play in the mixed-age and mixed-gender preschool classroom. The subjects are preschool children from Ohio University Child Development Center (OUCDC). Their ages are from 3 to 5. All subjects will be observed when they choose the activity of using computers from sitting in front of computer screen to leaving. The researcher is only an observer when any subject uses a computer. The study will last 5 weeks.

Benefits

This study carries several implications for teachers and parents. First and most important, it highlights the rich social environment offered by computer usage. Teachers should take advantage of this opportunity for fostering such cooperative learning behaviors as sharing ideas and group problem-solving. Second, given the right directions, children are capable of resolving their own conflicts.
Teachers, therefore, need to be careful about when they intervene and how much help they offer. Teachers and parents can better empower children by teaching them appropriate conflict resolution strategies.

**Risks and Discomforts**

This research does not involve any known risks of any kind for children.

**Confidentiality and Records**

All personal information will be kept confidential, and names will be replaced with code numbers after completion of the study. The research will be fully explained after the study is completed.

**Contact Information**

Finally, if at any time during the study you and your child have questions regarding you and your child’s rights as a subject you can contact the investigator (I-Chen, Hsu, (740) 593-6597, ih295599@ohio.edu) or the project advisor (Dr. Eugene A. Geist, (740) 593-2882, Geist@ohio.edu).

If you have any questions regarding your rights as a research participant, please contact Jo Ellen Sherow, Director of Research Compliance, Ohio University, and (740) 593-0664.

I hereby consent to participation by my child in the study described above. I understand that this study will take place in the preschool classroom and that my children will under the supervision of the designated school employee.

I understand that the observation does not include information from my child’s academic, guidance, permanent or cumulative record (i.e. grades or attendance records). I also understand that the observation does not include other personal
identifiable information such as my child’s address, phone number, or social security
number.

Name of student:

________________________________________________________________________

Parent’s signature:

________________________________________________________________________

Date:
APPENDIX B

Ohio University Human Subject Consent Form (For Teachers)

**Title of Research:** Peer Interaction Associated with Computer Use of Preschool Children

**Principal Investigator:** I-Chen Hsu, graduate student.

**Department:** Early Childhood Education

Federal and university regulations require signed consent for participation in research involving human subjects. After reading the statements below, please indicate your consent by signing this form.

**Explanation of Study**

This study is to investigate peer interaction associated with computer use of preschool children. Due to limited number of computers in the classroom, young children will share computer with their peers. The researcher will examine the patterns of child-child interactions and child-computer interactions during the free play in the mixed-age and mixed-gender preschool classroom. The subjects are preschool children from Ohio University Child Development Center (OUCDC). Their ages are from 3 to 5. All subjects will be observed when they choose the activity of using computers from sitting in front of computer screen to leaving. The researcher is only an observer when any subject uses a computer. The study will last 5 weeks.

**Benefits**

This study carries several implications for teachers and parents. First and most Important, it highlights the rich social environment offered by computer usage. Teachers should take advantage of this opportunity for fostering such cooperative learning behaviors as sharing ideas and group problem-solving. Second, given the right directions, children are capable of resolving their own conflicts.
Teachers, therefore, need to be careful about when they intervene and how much help they offer. Teachers and parents can better empower children by teaching them appropriate conflict resolution strategies.

**Risks and Discomforts**

This research does **not** involve any known risks of any kind for you.

**Confidentiality and Records**

All personal information will be kept confidential, and names will be replaced with code numbers after completion of the study. The research will be fully explained after the study is completed. Also, the videotapes of observation and interviews will be fully destroyed after the study is completed.

**Contact Information**

Finally, if at any time during the study you and your child have questions regarding you and your child’s rights as a subject you can contact the investigator (I-Chen, Hsu’ (740) 593-6597, ih295599@ohio.edu) or the project advisor (Dr. Eugene A. Geist, (740) 593-2882, Geist@ohio.edu).

If you have any questions regarding your rights as a research participant, please contact Jo Ellen Sherow, Director of Research Compliance, Ohio University, and (740) 593-0664.

I certify that I have read and understand this consent form and agree to participate as a subject in the research described. I agree that known risks to me have been explained to my satisfaction and I understand that no compensation is available from Ohio University and its employees for any injury resulting from my participation in this research. I certify that I am 18 years of age or older. My participation in this research is given voluntarily. I understand that I may discontinue participation at any time without penalty or loss of any benefits to which I may otherwise be entitled. I
certify that I have been given a copy of this consent form to take with me.

Signature                                      Date  ________________

Printed Name  ________________________________
APPENDIC C

Questionnaire

I will appreciate if you answer the questions:

1. Do you have a computer at home?
   Y _____  N _____

2. Does your child have experiences with using computer at home?
   Y _____  N _____

3. Does your child use computer at least six months?
   Y _____  N _____

Thank you for your help.

Please return it to the box on the front table of OUCDC.
APPENDIX D

Formal Interview Protocol for Classroom Teacher

1. Do you design curricular activities using computers?

If yes, how?

If not, why?

2. How do you motivate children to use computers?

3. How do you arrange and choose software for your classroom?

4. Do you intervene when children used computers?

If yes, in what kind of situation?

If not, why?

5. Do you have rule for children to use computers?

If yes, what?

6. How do you solve a conflict when it happens during computer time?

7. Do children have any problems using the computer?

Thank you for your cooperation!