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The use of teacher facilitation during computer activities to improve the social interaction of preschool children in inclusive classrooms

Cynthia Lau
University of Nevada, Las Vegas

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THE USE OF TEACHER FACILITATION DURING COMPUTER ACTIVITIES TO IMPROVE THE SOCIAL INTERACTION OF PRESCHOOL CHILDREN IN INCLUSIVE CLASSROOMS

by

Cynthia Lau

Bachelor of Arts
University of California, Berkeley
1986

Master of Science
San Jose State University
1992

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of the requirements for the

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Cynthia Lau

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Kyle Higgins
Examination Committee Chair

Dean of the Graduate College

Examination Committee Member

Examination Committee Member

Graduate College Faculty Representative

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ABSTRACT

The Use of Teacher Facilitation During Computer Activities to Improve the Social Interaction of Preschool Children in Inclusive Classrooms

by

Cynthia Lau

Dr. Kyle Higgins, Examination Committee Chair
Professor of Special Education
University of Nevada, Las Vegas

Social competence is a major focus in early childhood education and there is a need for effective teaching methods to increase social skills for both children with and without disabilities. Even though technology is used as a tool for teaching young children, there is limited research on the use of structured teaching coupled with assistive technology to facilitate social skill development in young children.

This study investigated the impact of teacher facilitation during computer activities on the social skill development and concurrent interactions of young children. The study compared dyads comprised of children with and without disabilities who received teacher facilitation during computer activities to a matched group of children who did not receive teacher facilitation. The sessions were videotaped for the purpose of analyzing the social interactions and behaviors of the children. Pre-and post-measures of

social skills and systematic observation of social interactions during the study were analyzed using statistical tests. Because younger preschool children often exhibit different social skills and interactions than pre-kindergarten children, the social skills and interactions of the younger children were compared to the older children.

In this study preschool teachers perceived that the children with disabilities improved their social skills more than the children without disabilities, regardless of the intervention group assignment. All of the children in the study exhibited few negative social interactions regardless of their age, disability status, or intervention group assignment. The children with and without disabilities in the teacher facilitated computer group had more positive social interactions and demonstrated more effective social behaviors than the children in the computer only group. The older children exhibited more effective social interaction behaviors than the younger children.

Qualitative analysis of interviews conducted with the two participating special education teachers also were analyzed. Domain and componential analyses of the interviews indicated that the teachers believed that the computer activities provided an effective context for the facilitation of social interaction. They also believed that the children in the teacher facilitated computer group improved their social competence more than the children in the computer only group.

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CHAPTER 1

INTRODUCTION

Widespread services for children with disabilities began with the passage of the Education for All Handicapped Children Act (P.L 94-142) in 1975. However, comprehensive services for young children with disabilities did not begin until 1986 with the passage of the Education of the Handicapped Act Amendments (P.L. 99-457). Prior to these two landmark pieces of legislation early intervention research primarily focused on the differences between children who received early intervention services and those who did not receive services. Meta-analyses of multiple studies from this time period found that early intervention was beneficial for children with disabilities (Casto & Mastropieri, 1986; Shonkoff & Hauser-Cram, 1987).

In the not so distant past, preschool children with disabilities were educated on elementary school campuses in self-contained classrooms (Bricker, 2000). Currently, preschool-aged children more often receive educational services in community-based preschool or daycare environments (Buysse, 1993). This change in educational environments is due to the recognition that children with disabilities are best educated with children without disabilities in age appropriate and inclusive settings (Division for Early Childhood Task Force on Recommended Practices, 1993). The Individuals with Disabilities Education Act (IDEA) of 1990 designated the natural environment and the least restrictive environment as the location in which children with disabilities should

receive early intervention services. These concepts were reemphasized in the reauthorization of IDEA in 1997 (Individuals with Disabilities Education Act Amendments, 1997). In a comprehensive review of the literature using an ecological systems framework, Odom (2000) found that preschool inclusion for children with disabilities leads to positive developmental outcomes for the children.

Despite overall positive outcomes in inclusive settings compared to traditional self-contained settings, children with disabilities continue to interact socially less often with their peers than do to typically developing children (Guralnick, Connor, Hammond, Gottman, & Kinnish, 1995). As a result, early intervention has begun to focus on promoting the social development of children within these environments.

This social development is of particular importance for young children with disabilities. The National Association for the Education of Young Children (NAEYC) (Bredekamp & Copple, 1997) identified social development as being critically important for young children. Currently, the primary direction of early intervention research deals with the identification of specific program features associated with optimal outcomes for children and families (Guralnick, 1997; Bricker, 2000). These features include teaching strategies directed toward the social development and social skill acquisition of young children with disabilities. The use of teacher facilitation and technology are two independent methods to develop social competence in young children that have been researched (Butz, 1999; Hyatt, 2000; LeBlanc & Matson 1995; McCormick, 1987; Spiegel-McGill, Zippiroli, & Mistrett, 1989).

Social Competence in Young Children

Social competence has been defined along a continuum that encompasses a person's popularity, friendship, and/or peer acceptance (Asher & Hymel, 1981) and includes the skills a person uses to perform competently in the presence of other individuals (Gresham, 1986). For young children, Guralnick (1990) suggests that peer-related social competence consists of the ability of the child to successfully and appropriately select and carry out interpersonal goals. These interpersonal goals involve relationships and reciprocal interaction with others and require the use of specific social skills among young children. Children and adults often perceive these relationships as friendships.

The importance of social competence lies in its influence on the learning that occurs in the early years of life (Guralnick, 1990). According to Vygotsky's sociocultural theory (1930-1934/1978), mental functions such as attention, memory, and problem solving have their origins in social interaction. Through the zone of proximal development, a child accomplishes a task that he/she can not yet perform independently with the help of adults or peers within the social context. Therefore, focusing on the improvement of social skill development to increase social competence may help children develop successful peer relationships and in turn help them learn.

Social Skills Development in Typically Developing Young Children

During the preschool years, the interactions of children become more complex and there is an increase in the quality and quantity of interactions with peers (Howes, 1988). Friendship serves as the context of social development for young children and preschool children. A preschool child usually is able to identify a friend as someone

he/she likes and someone with whom he/she spends time playing (Youniss, 1980). Preschool children engage in more social interaction with their identified friends and exhibit more social skills such as greetings and praise during play with these friends (Hartup, 1996). Furthermore, children who are socially competent often develop higher cognitive and communication skills (Odom, McConnell, & McEvoy, 1992).

Play is the means by which children acquire social skills such as turn taking, sharing, cooperation, and empathy (Johnson, Christie, & Yawkey, 1987). In a classic study, Parten (1932) studied the interactions of young children in nursery school and noted that between the ages of three to six-years-old, there is a significant increase in interactive play. She concluded that social development begins with nonsocial activity and proceeds to parallel play, to associative play, and finally to cooperative play. As the child develops between the ages of three and six, he/she will participate in more associative and cooperative play. With each sequential type of play, there is more social engagement with peers. This results in children who have effective social interaction skills being chosen more often as playmates by peers (Tremblay, Strain, Hendrickson, & Shores, 1981). These social skills include sharing, helping others, requesting assistance, and organizing play activities. For most children, learning to interact with others and playing together is a typical part of childhood, but for children with disabilities social skill development may be problematic (Odom, McConnell, & Chandler, 1993).

Social Skill Development in Young Children with Disabilities

Development of a child's social competence is considered an important focus in the field of early intervention (Guralnick, 1990; Odom, 2000). Social interaction and friendship formations are major developmental activities, in and outside of the classroom,

for young children. Young children with disabilities often exhibit problems with this social competence (Guralnick, 1990; Landry, Chapieski, Richardson, Palmar, & Hall, 1990). Special education teachers report that 75% of preschool-age children with disabilities need to acquire skills in order to interact with their peers in a positive and age-appropriate manner (Odom, McConnell, & Chandler, 1993). Parents and teachers indicate that the characteristics of the children, opportunity to spend time together, and classroom structure are factors associated with friendship formation among children with disabilities and their typically-developing peers (Buysee, 1993).

Children with a variety of disabilities (e.g., sensory impairments, autism, mental retardation, learning disabilities, and behavioral disorders) often exhibit significant social skill deficits (Guralnick, 1990; Strain & Kohler, 1988). Specifically, children with disabilities lack skills in initiating, maintaining, and terminating interactions (Evan, Salisbury, Palombaro, Berryman, & Hollowood, 1992; Hanline, 1993; Schnorr, 1990). Social skill deficits in children with disabilities may result in peer rejection, disproportionate placement in special classes, and poor self-esteem (Strain, 1981). Social skill difficulties can negatively impact social interaction and friendship formation in the elementary school years (Sale & Carey, 1995).

Social Interactions Among Young Children in Integrated Settings

Inclusion of young children with disabilities into settings in which typically-developing children are educated is an accepted social policy and is required by public legislation such as the Individual with Disabilities Education Act (Buysee & Bailey, 1993; IDEA, 1997). Early inclusion may help decrease the need for further special education and promote the social skills of children with and without disabilities

(Guralnick, 1990; Kishi & Meyer, 1994). A review of the literature indicates that young children with disabilities function as well in inclusive settings as in traditional special education settings (Buysse & Bailey, 1993).

However, simply placing children with disabilities in general education settings does not necessarily improve their social skills. Jenkins, Odom, and Speltz (1985) compared the developmental status and social interaction of children with disabilities placed in integrated and nonintegrated preschool settings. They found that integration, without specific programming to encourage interaction, did not have a significant effect on the social interaction of the children. Further research conducted in integrated settings indicates that young children with disabilities interact less, receive less prosocial directed behaviors, and have fewer reciprocal friendships when compared to children without disabilities (Buysee, 1993; Guralnick et al., 1995; Hall, 1994). Odom, Zercher, Li, Marquart, & Sandall (1998) found that one-third of the children in inclusive preschool programs are socially rejected. Therefore, professionals working with young children with disabilities must focus on the improvement of social competence as a fundamental aspect of a child's intervention plan in order to facilitate his/her social integration in the inclusive classroom (Guralnick, 1999; Odom, 2000).

Technology in Early Childhood Education

The position statement of the National Association of the Education of Young Children (NAEYC) (1996a) calls for early childhood educators to promote access to appropriate technology for children with disabilities as a tool to support the successful inclusion of these children. Assistive technology includes any item, piece of equipment,

or product system used to increase, maintain, or improve the functional capabilities of children with disabilities (Technology-Related Assistance for Individuals with Disabilities, 1988). The technologies may be acquired commercially, off the shelf, modified, or customized. Lesar (1998) defines assistive technology as computers, software, and peripheral interfaces (e.g., keyboard, mouse, expanded keyboard, voice activated device). While there is an abundance of computer technology available for young children, it has been under utilized in the preschool setting (Behrmann, Jones, & Wilds, 1989). One factor that may influence the lack of computer activities in the preschool classroom is the negative reactions of early childhood personnel who often have limited experience with assistive technology (Bredekamp & Rosegrant, 1994). Despite this lack of experience, computer technology is becoming increasingly common in early childhood settings. Haugland and Shade (1994) found that 79% of early childhood teachers used computers with their three-to-five year old students.

Technology in early childhood settings is considered a method to support the learning of young children and to enhance their cognitive and social abilities (NAEYC, 1996a). Studies indicate that young children gain cognitive skills through the use of computer activities (Clements & Nastasi, 1988; Haugland, 1992; Perlmutter & Behrend, 1985). Haugland (1992) found that four-year-old preschoolers who used developmentally open-ended software made significant gains in intelligence, nonverbal skills, structural knowledge, long-term memory, complex manual-dexterity, and self-esteem compared to children who used nondevelopmental drill and practice software. In another study, children who used an open-ended software program demonstrated more

conflict resolution and rule determination than another group of children who used drill-and-practice software programs (Nastasi & Clements, 1993).

In a study designed to assess the effectiveness of computer software to teach alphabet and number skills, Perlmutter and Behrend (1985) found that preschool children were more engaged, showed more positive affect, and remembered more about the experience when working in pairs than did children who worked alone on the computer. In a similar study, McCormick (1987) found that computer activities were as effective as a toy in stimulating language skills between pairs of children with and without disabilities. Young children benefit from the social context when learning new skills on the computer (Davidson & Wright, 1994).

Technology Used to Facilitate Social Skills Development

Professionals in the field of early childhood education are beginning to realize that computer activities are not detrimental to the development of children, but actually have a positive impact on the awareness, exploration, and inquiry of preschool children (Bredekamp & Rosegrant, 1994). The use of technology is considered developmentally appropriate practice in early childhood education (NAEYC, 1996a) as is the focus on social competence (Guralnick 1993). The use of computers to facilitate cognitive and social skills development in children with and without disabilities is a growing research focus in early childhood education (Howard, Greyrose, Kehr, Espinosa, & Beckwith, 1996).

Technology has the potential to increase the peer-related social skills of children with disabilities (Behrmann & Lahm, 1994). In a longitudinal study of children with multiple disabilities, teachers reported that assistive technology had the greatest impact

on the social and emotional outcomes of the students (Hutinger, Johanson, & Stoneburner, 1996). In self-contained settings, Howard et al. (1996) found that young children with disabilities showed more positive affect and communication with their peers when engaged in computer-based activities compared to table-top play activities.

The use of computer activities with preschoolers, with and without disabilities, shows promise for interactive play and social interaction (Behrmann & Lahm, 1994; Davidson & Wright, 1994). McCormick (1987) observed children with and without disabilities in an integrated preschool as they engaged in computer activities and played with toys. The children showed a greater percentage of associative play during the computer activities than when they played with toys. Spiegel-McGill et al. (1989) studied the social interaction between children with and without disabilities when they played with the computer and a remote controlled robot. They found that children with significant language and social deficits displayed more social interaction during the computer activity.

Because young children seek assistance from each other when working on the computer (Clements, Nastasi, & Swaminathan, 1993), and they seem to prefer assistance from peers rather than the teacher when engaged in computer activities (Nastasi & Clements, 1993), the pairing of technology and social skill intervention appears to be a natural one. Brett (1994) supports this pairing with her findings that children, when using open-ended software, engage in conversations, focus on turn taking, are cooperative, and help each other.

Interventions to Increase Social Competence

Schneider and Byrne (1985) in a meta-analysis of social skill training programs for young children, found that social interventions in the preschool years had considerably greater effect than interventions that occurred in middle or later childhood. The promotion of peer interaction is important before behavior patterns become well established and the child develops a reputation for being antisocial (Hartup & Moore, 1990). The importance of these early relationships has been recognized by the National Association for the Education of Young Children (NAEYC) in their mandate that developmentally appropriate practice incorporate education on forming and maintaining relationships with peers (Bredekamp & Copple, 1997). This emphasis on social competence is even more vital for young children with disabilities (Guralnick, 1999).

Intervention directed at increasing social competence is affected by environmental, teacher, and peer factors (Odom, McConnell, & McEvoy, 1992). Teaching strategies directed at social interaction skills vary according to environmental factors (e.g., materials, physical arrangement of classroom, and grouping of children), teacher involvement, and the role of the typically developing peers. These factors may be combined or manipulated according to the needs of the students.

Interventions Directed at Social Interactions in Integrated Settings

The efficacy of social skill teaching strategies for young children has been demonstrated in several research studies (Hyatt, 2000; Jenkins, Odom, & Speltz, 1989; LeBlanc & Matson, 1995). LeBlanc & Matson (1995) investigated the efficacy of a social skills training program for preschoolers with disabilities. They found that when the children were instructed in specific social skills over a six-week period, the children

increased their prosocial behaviors and generalized the learning to new skills and to new peers. They also found that the inappropriate behaviors of the children were reduced.

Jenkins, Odom, and Speltz (1989) compared the effect of teacher-facilitated, structured play groups to child-directed play on the social interactions of children in self-contained and integrated classrooms. They found that teacher facilitation of social skills during play groups in integrated classrooms resulted in more interactive play among children compared to the child-directed play situation in the segregated classrooms. Children with disabilities in the integrated classes who participated in the teacher-facilitated, structured play groups received significantly higher scores on a teacher-rated social competence scale.

Hyatt (2000) compared proactive versus reactive teacher facilitation strategies directed at the social skills of children with and without disabilities in an inclusive preschool. Proactive strategies included teaching the children to join in, discussing the importance of the social skill with the children, identifying the steps to complete the skill with the children, modeling the skill, and providing feedback to children as they role-played the skill. Reactive strategies included praising children for positive peer imitations and praising them for positive peer responses. The study findings indicate that teacher facilitation strategies, especially reactive strategies, are effective for increasing the interaction among children with and without disabilities.

Because children with disabilities have a difficult time socially interacting with their peers, there is a need to develop teaching strategies that are effective for increasing the social skills of children in inclusive preschool classrooms. Computer activities are becoming common activities for preschool children, therefore, they may be used to

facilitate social interactions among children with and without disabilities in the classroom. In addition, the teacher role during computer activities can be used to facilitate social interaction. Research indicates that teachers are able to influence the social interaction between children with and without disabilities (Hyatt, 2000; Jenkins et al.,1989) and, there is preliminary evidence that computer activities are conducive to facilitating social interactions between children with and without disabilities (McCormick, 1987). A literature review concerning assistive technology applications for young children with disabilities indicated that there is a need for additional research to investigate the effectiveness of specific adult teaching strategies coupled with the use of technology on the social development of young children (Kinsley & Langone, 1995). With the emergence of inclusion and the growing use of technology in early childhood education, there is a need to evaluate the pairing of teacher facilitation with computer activities to enhance the social interaction among children with and without disabilities.

Statement of the Problem

Children with disabilities can benefit from social skill interventions particularly in an inclusive environment in which they have the opportunity to interact with their typical developing peers. Teacher facilitation and technology are tools that teachers may use to facilitate the interaction of young children. The problem investigated in this study focused on the use of teacher facilitation paired with computer activities to improve the social interactions among children with and without disabilities in an inclusive preschool environment. Specifically, the following questions were addressed:

1. Do the preschool teachers perceive children with and without disabilities in the teacher facilitated computer group as improving their social skills more than the children with and without disabilities in the computer only group?
2. Do the children with and without disabilities in the teacher facilitated computer group have more positive and less negative interactions as measured by the Observer Manual than the children with and without disabilities in the computer only group?
3. Do the children with and without disabilities in the teacher facilitated computer group have more effective and less ineffective social behaviors as measured by the Social Interaction Observation System than the children with and without disabilities in the computer only group?
4. Do older and younger preschool-aged children in the teacher facilitated computer group have more positive and less negative interactions as measured by the Observer Manual than the older and younger children in the computer only group?
5. Do the older and younger preschool-aged children in the teacher facilitated computer group have more effective social behaviors and less ineffective social behaviors as measured by the Social Interaction Observation System than the older and younger children the computer only group?
6. What are the perceptions of special education teachers regarding the use of computer activities and teacher facilitation to improve to social skills of young children with and without disabilities?

Significance of the Problem

As more children with disabilities enter community-based preschools, early childhood personnel must provide instructional methods that focus on the social competence of the children. In an inclusive setting, children with disabilities need instruction on the components of social interaction and children without disabilities need instruction on how to respond to the social cues of the children with disabilities (Hanline, 1993). Specific teaching strategies are necessary to improve the social interactions among children with and without disabilities so that successful inclusion is achieved (Salisbury, Gallucci, Palombaro, & Peck, 1995). There has been limited research concerning the use of computer activities to facilitate social interactions among children with and without disabilities in an inclusive setting (Kinsley & Langone, 1995). The purpose of this study was to examine the use of computer activities and teacher facilitation to increase the social interaction among children in an inclusive preschool setting.

There are conflicting opinions in early childhood education concerning the value of adult intervention to facilitate social interaction among preschoolers. Dodge and Colker (1992) who developed the Creative Curriculum, suggest that child-directed activities are the most appropriate activities for children, however, Wolfberg and Schuler (1992) and Odom and McConnell (1997) emphasize the direct teaching of specific social interaction behaviors. Studies using computer activities to impact the social skills of children have not considered teacher intervention as a mediating factor (McCormick, 1987; Spiegel-McGill et al. 1989). There is limited research on the level of teacher intervention needed to facilitate social interaction during computer activities (Kinsley &

Langone, 1995). The researcher in this study investigated the impact of computer activities with and without teacher facilitation on the social skills and interactions of preschool children with and without disabilities.

The efficacy of assistive technology, specifically computer activities, has been an issue of debate in the field of early childhood (Pierce, 1994). Typically, computers are viewed by teachers as supplemental, rather than essential in the daily teaching of young children (Huntinger, Robinson, & Johanson, 1990). In addition, teachers are concerned that computer activities may be detrimental to the social and emotional development of young children (Clements & Nastasi, 1993; Bredekamp & Rosegrant, 1994). The researcher of this study generated information concerning teacher perceptions regarding computer use to increase social interaction in inclusive classrooms.

Preliminary research indicates positive effects of computer activities on the social interactions of young children (Howard et al., 1996; Huntinger, Johanson, & Stoneburner, 1996; McCormick, 1987; Nastasi & Clements, 1993; Spiegel-McGill et al., 1989). However, the findings of these studies are limited in that most used a small number of participants, self-contained settings, and investigated only the social skills of the children with disabilities or the children without disabilities. Information concerning the use of technology by children with and without disabilities and the impact of that use on peer social interaction is important for the field of early childhood education as it provides educators with justification for the integration of computer activities into the daily curriculum.

Because there is limited research dealing with the use of technology with young children, the researcher of this study explored the use of computer activities coupled with

teacher facilitation to improve the social skills and interactions of children in an inclusive setting. The findings contribute to the knowledge-base of effective strategies concerning: (a) social interaction of preschoolers in inclusive classrooms, (b) use of computer activities, and (c) use of teacher facilitation. In this study, the impact of computer activities with and without teacher facilitation on the social skills and interactions between children with and without disabilities in the classroom was examined. Secondly, the differential effect of the computer activities on the younger preschool children compared to the older preschool children was investigated. And, finally, the beliefs of the special education teachers concerning the advantages and disadvantages of computer use with teacher facilitation to improve social skills provided insight for structuring social skill interventions.

Definitions

Children with Disabilities. Children with disabilities were students who were eligible for special education services and who had a current Individualized Education Program (IEP). The disabilities of children in this study included: (a) Developmental delay, (b) Autism, (c) Down syndrome, (d) Cerebral palsy, (e) and Fragile X syndrome.

Children without Disabilities. Children without disabilities were students who were not eligible for special education services and did not have a current Individualized Education Program (IEP).

Computers. The computers used in this study were: (a) one Macintosh Performa 636CD with 32 MB memory, (b) one Power Macintosh 5400/200 with 16 MB memory,

(c) one Macintosh Performa 5200 CD with 16 MB memory, and one (d) Dell PC Pentinum II with 64 MB memory. Each classroom contained at least one computer.

Effective Social Interaction Behaviors. Effective behaviors included: positive interaction, parallel play, associative and/or cooperative play, positive linguistic interaction, interaction initiations, and positive responses to peers (Kreimeyer, Antia, Coyner, Eldredge, & Gupta, 1991).

Ineffective Social Interaction Behaviors. Ineffective behaviors included: negative behaviors, nonplay behavior, solitary play, negative responses to peers, and no response to peers (Kreimeyer et al., 1991).

Inclusive Classroom. The inclusive classroom was a general education classroom that contained all supports (e.g., itinerant special education teacher, assistive technology, modified curriculum) and related services (e.g., occupational, physical, and speech therapies) called for in the students' Individualized Education Programs. Services were provided in these classrooms in a collaborative model of education (Filler, 1996).

Social Competence. Social competence was the ability to initiate and sustain interactions with others, resolve conflicts, build friendships, and achieve related interpersonal goals (Guralnick & Neville, 1997).

Negative Social Interaction. Negative social interactions included snatching materials or toys from a peer without asking and receiving permission, shouting, hitting, throwing, pulling, or pushing away (Antia, Kreimeyer, & Eldredge, 1990).

Positive Social Interaction. Positive social interactions included giving requests and polite refusals, sharing materials, playing cooperatively, participating in interactive games, and physical signs of affection (Antia et al., 1990).

Open-ended Software Programs. Open-ended software programs were developmentally appropriate software programs in which the children controlled the program and made decisions as well as solve problems (Haugland & Wright, 1997). The software programs contained concrete and realistic representations of people, animals, and objects.

Elmo's Art Workshop (Learning Company, 1998). This program is an open-ended art program that allows children to decorate pages with stickers and paint, fill in coloring book scenes, and dress characters in costumes. The program was developed for children 3-to-6 years of age.

Preschool Teachers. The four preschool teachers in the study were the regularly assigned general education teachers of the students participating in the study. The Hearts classroom teacher was working on an undergraduate degree in English. The Ladybugs and Butterflies classroom teachers were working on undergraduate degrees in Early Childhood Education. The Rainbow classroom teacher had a Bachelor's Degree in Early Childhood Education and was working on her Master's degree in Early Childhood Special Education.

Special Education Teachers. The special education teachers were the itinerant teachers assigned to the preschool. These teachers were also the teacher facilitators who participated in the teacher facilitation portion of the study. They both had Master's Degrees in Special Education.

Social Skills. Social skills were the skills contained in the Teacher Impression Scales (TIS) (McConnell & Odom, 1993). They included behaviors such as conversing appropriately, taking turns, playing cooperatively, persisting in social attempts,

spontaneously responding to peers, smiling appropriately at peers, engaging in play activities in which social interaction might occur.

Teacher Facilitation. Teaching facilitation was a teaching method based on the prompting procedure from *Play Time/ Social Time* (Odom & McConnell, 1997). It included the use of a five-step prompting procedure: (1) observe children and identify times of noninteraction, (2) provide a specific prompt to the child with the disability or peer to begin interaction or respond to an initiation, (3) observe the child for compliance to the prompt and provide a more specific prompt, if needed, (4) observe the child for compliance with the specific prompt, provide physical guidance, and (5) observe the child for compliance with the specific prompt and physical guidance.

Video Camera. The video cameras used in this study were Panasonic Palmcorders VHSC with a 23x high definition zoom lens. They were used to record the social interactions of the children in the study.

Limitations

1.) The data in this study were collected at one preschool program, the University of Nevada, Las Vegas/Consolidated Students University of Nevada (UNLV/CSUN) Preschool. This preschool is based on a strong inclusion philosophy and is accredited by the NAEYC (National Association for Early Childhood Education). Because other preschools may have different philosophies and standards, the findings of this study should be generalized judiciously.

2.) Because the focus of the this study was the social interaction between children with disabilities and their typically-developing peers in inclusive classrooms, the results

of this study should not be generalized to self-contained settings or other settings that contain more children with disabilities than children without disabilities.

3.) Qualitative interview data were collected from only two teachers. The statements of these teachers should not be generalized to other settings or teachers, but should be used as a starting point for further investigation.

4.) Data were collected only for a ten-week time period. Intervention over a longer time period might yield different results.

5.) There was no control group of children who received no intervention therefore it is not possible to isolate of the effects of computer activities on the social interaction of the children.

Summary

Social competence is a major emphasis in early childhood education (Bredekamp & Copple, 1997). Because of this, there is a need for effective teaching methods to increase social skill development for both children with and without disabilities in the inclusive classroom environment (Hanline, 1993; Sainato & Carta, 1992). Even though assistive technology has been used as a tool for teaching young children, there is limited research on the use of computer activities as a means of facilitating social skill development for young children (Kinsley & Langone, 1995). The purpose of this study was to explore the use of computer activities and teacher facilitation to increase social interaction between children with and without disabilities in an early childhood education setting. The findings of the study contribute to the knowledge base concerning effective

strategies to promote social skills and social interaction of children with and without disabilities in the inclusive classroom.

CHAPTER 2

REVIEW OF RELATED LITERATURE

Early childhood is a developmental stage in which children learn to play and socially interact with one another (Johnson, Christie, & Yawkey, 1987). Because of the importance of these interactions, social competence is a primary focus in early childhood education (Guralnick, 1997). Unfortunately, young children with disabilities do not experience the same quality of social interaction (Guralnick, 1990) and they often exhibit less prosocial behaviors than their peers without disabilities in integrated settings (Guralnick et al. 1995; Hall, 1994). These social skill deficits may negatively impact social interaction and friendships in their later development (Sale & Carey, 1995).

Current research focuses on effective teaching strategies to support the social competence of young children with disabilities within these integrated environments (Odom, et al., 1999). Environmental arrangement, teacher facilitation, and peer mediation are three teaching methods that are used to facilitate social interaction within the integrated preschool setting.

Environmental arrangement includes the creation of activities and structures so that children with and without disabilities play together. Grouping strategies and selection of play materials are included in the environmental arrangement to promote play and social interaction of the children. Pairing children with and without disabilities and increasing the structure of their play activities also are used to promote play, social

interaction, and cooperation among the young children (DeKlyen & Odom, 1989; Jenkins, Odom & Speltz, 1989; Guralnick et al. 1995).

In addition to the traditional environmental arrangement, the use of technology may be used to increase the social interaction of young children. To facilitate social interaction, NAEYC (1996a) recommends the use of technology. Computer activities can increase peer play behaviors as well as social interaction among children with and without disabilities (Anderson, 2000; McCormick, 1987; Spiegel-McGill et al., 1989).

The role of the teacher in the learning environment is also a consideration when promoting social interaction. Teachers may use modeling, direct instruction, praise, and token reinforcement to increase social skills (Butz, 1999; Hyatt, 2000; Odom et al., 1986). Teacher facilitation can increase the social initiations and responses of children with disabilities in play situations. In addition, specific curricular and teaching prompting procedures have been developed for integrated settings (Odom & McConnell, 1997; Peterson & McConnell, 1996).

Peer social interactions occur in the context of playing with same age peers for young children. The peer mediated approach to social learning involves peers with higher-level social skills participating in social interactions with children with disabilities. Peers are taught to share, request to share, assist, display affection, and compliment children with disabilities (Odom et al., 1986). Peer mediated intervention, taught by teachers, is effective in increasing the social initiations and interactions among children with and without disabilities (Odom, et al., 1999).

Because the development of social competence is important for young children with and without disabilities, there is a need to develop effective teaching methods

directed at increasing the social skills and social interaction among children in integrated educational settings. The following is a review of the literature in areas related to this study including social development of young children with and without disabilities, social interactions in inclusive settings, intervention strategies to improve social interaction, and the use of technology to facilitate social interaction. Even though technology has shown promise as a means of facilitating play and social interaction, there is a lack of research-based information regarding the use of computers coupled with teacher facilitation to develop the social skills of young children.

Social Interaction of Young Children

Social competence gradually develops in young children in that it is developmental in nature and results from practice over time. The development of social skills is often the result of practice with same age peers in the preschool environment. The play and social interactions of typically developing children become longer and more complex over time. However, children with disabilities often have problems initiating and maintaining social interactions characteristic of reciprocal friendships. This results in young children with disabilities experiencing less successful social interactions than their peers without disabilities.

Social Development and Friendships of Young Children Without Disabilities

Vygotsky (1935/1978) theorized that the social interaction of children with adults and peers is closely tied to cognitive development. Social interaction with the teacher occurs through explanations, demonstrations, and prompts provided by the teacher to guide a child's learning. Conversely, social interaction with peers occurs within the

context of play. The zone of proximal development (Vygotsky, 1935/1978) refers to a range of tasks that the child cannot handle independently, but can accomplish with the help of more skilled partners. According to Vygotsky, play is the ideal social context in which children try out challenging activities within the zone of proximal development. This reliance on the social interaction with adults and peers provides an arena in which children attempt and learn new play and social skills.

Even though social development and peer relations are important in early childhood education there is a dearth of data-based research concerning the development of peer social interaction in young children. In a classic research study, Parten (1932) observed and described the sequential development of the peer play of preschoolers. Her work recently was expanded upon by Howes and Matheson (1992) who showed that different forms of social play did not replace each other, but coexisted sequentially.

Parten (1932) attempted to order children's peer play into a developmental sequence based on her observations of young children in nursery school. The study was conducted at the Institute of Child Welfare at the University of Minnesota and included 42 children between the ages of two-and-five-years. The intelligence (IQ) scores of the children ranged from 81 to 145.

Observations of the children occurred daily over a nine-month period during free-play. During the observations, the children were allowed to play with any toy and anyone they chose. Available toys included sandboxes, swings, toy cars, painting supplies, and dolls. The teachers made few suggestions and were present only to settle problems.

Four observers rated the play behaviors of the children. After three months of observations, a scale of social participation was developed by Parten that included the behavioral categories of: unoccupied behavior, onlooker, solitary independent play, parallel activity, associative play, and cooperative play. Unoccupied behavior was defined as a child not playing, but occupied by watching others or playing with her/his own body. Onlooker play involved a child watching other children play, but not overtly playing. Solitary independent play involved a child playing alone, independently with toys different from those used by other children. In parallel play, the child played with toys like those of the other children, but not attempting to influence or modify the activity of the other children. The child played beside rather than with the other children. During associative play, the child played with the other children and there were conversations, borrowing, and loaning of play materials. In cooperative play, the child played in a group organized for the purposes of making some end product, striving to attain some competitive goal, dramatizing situations, or a formal game. In cooperative play, the child experienced a sense of belonging or not belonging to the group.

After these categories were defined by Parten (1932), the observers used a one-minute sampling observation method to obtain a measure of the frequency of the behaviors. All observers watched the same child during the one-minute. The target child changed daily. After the one-minute observation, the observers rated the degree of social participation, the number of children involved with the target child, the names of children who were in the group, and wrote a brief description of the activity. Each child was observed at least three times across seven, one-hour play periods. Interrater reliability ranged from 86% to 92% between each observer.

The number of observations obtained on each child varied from 12 to 100. Therefore, the actual number of times each child was observed in a play situation could not be used as an index of the social participation of the child. Instead, the percentages of the different levels of social participation of each child were calculated. Only five children showed unoccupied behaviors between 2% to 12% of the intervals.

All of the children participated in solitary play, but there was much variation in the amount of solitary play. One child was observed playing alone only 1.2 % of the time. He had an IQ score of 111 and played in highly organized group situations about 90% of the time. On the other hand, four children participated in solitary play 30% of the time. They were younger than the average age of the children in the group and their IQ scores were near or below average.

All but two of the children participated in onlooker behavior. This behavior was not observed as often as solitary and cooperative play. One child participated in onlooker behavior 35% of the time and was also unoccupied 23% of the time. Parten (1932) suggested that children who exhibited more unoccupied play typically exhibited more onlooker and solitary play.

Parallel activity was engaged in frequently by almost all the children. Two-thirds of the children played in parallel activity more than 33% of the time. In general, the younger children participated in more parallel play than the older students. All of the children, except one, participated in associative play. Sixteen of the 42 children were observed in over one-third of the total number of observations participating in associative play. Twelve of these children were over three-years old.

Cooperative activity varied from 1% to 57% of the observations. The six individual children who engaged in cooperative activity more than 33% of the time were over the age of three-years and their mean IQ was 120. Parten (1932) suggested that more sophisticated social types of play (associative and parallel) occur most frequently in the older children and those children with higher IQ scores.

Because thirty-four of the 42 children had 60 or more observations, Parten (1932) selected the first 20, middle 20 and last 20 observations of these children for analysis. Averages for each social participation category were computed for the total number of times each child was found engaged in a particular play category out of the possible 60 times. The children participated in parallel activity (19 observations) most frequently, followed by associative (14 observations), solitary (10 observations), cooperative (9 observations) and onlooker (4 observations). On average, the three unsocial play types unoccupied, solitary, and onlooker made up about 25% of the observations. The social play types parallel, associative, and cooperative made up 75% of the observations.

Parten (1932) then divided the children by ages: 2-to-2.5-years, 2.5-to-3-years, 3.5-to-4-years, and 4.0-to 4.5-years and charted the mean number of times a child participated in each category of social participation. The children aged 2-to-2.5 and 2.5-to-3 years participated most in parallel play followed by solitary play. They had lower levels of associative and cooperative activity compared to the older children. In addition, some of these children also participated in unoccupied play; they were the only children to do so.

Children aged 3.0-to-3.5-years and 3.5-to 4.0 years participated most in associative group and parallel play followed by cooperative play. They engaged in less solitary and onlooker play than the younger group and no unoccupied play.

The oldest group of children, the 4.0-to-4.5 year olds, primarily engaged in associative group play followed closely by cooperative and parallel play. They participated least in solitary and onlooker play compared to the younger children and no unoccupied play was observed.

Based on the free-play of children in the nursery school, Parten (1932) concluded that social participation is dependent largely on the maturation of the children. She believed that social development proceeds sequentially and begins with nonsocial activity, shifts to parallel play, transforms to associative play, and eventually results in cooperative play. With each sequential step, social participation increases and the interactions between the children become more sophisticated (Parten, 1932).

Expanding on the work of Parten (1932), Howes and Matheson (1992) completed two separate studies that were reported in the same article concerning the sequence of children's social play. They were interested in the qualitative shifts of social competence in which children moved from less to more involved types of play. These studies examined the social competence and developmental play sequences of children from infancy through the preschool years.

In the first three-year longitudinal study, the authors hypothesized that particular play forms serve as markers of social competence within particular developmental periods. Forty-eight children, 23 girls and 25 boys from middle-class and working-class families, participated in the study. At the beginning of the study, the children were

between 13-to- 24-months of age and participated in some form of child-care. Most of the children were in full-day, center-based programs.

Data were collected every six months over the course of three years for a total of six observational periods. Each child was observed in the child-care setting on two separate occasions by two observers. These observations were scheduled when the child was free to interact with both adults and peers. During the observations, the observers coded three, 5-minute samples of each child's behaviors. This resulted in 30-minutes of coded behavior per observation and 60-minutes of coded behavior per child across the two occasions. The 5-minute samples were spaced every 20 minutes throughout the hour. The child's behavior was coded using the Howes Peer Play Scale (1980) that includes different components of peer play including parallel play, simple social play, reciprocal play, cooperative social pretend play, and social pretend play. The peer play behaviors were rated as present or absent.

In addition to behavioral observations, four measures of social competence were used in this study. The Pictorial Scale of Perceived Competence and Acceptance for Young Children (Harter & Pike, 1984) provided information on the child's perceived competence with peers. An assessment procedure involving enactment of social dilemmas developed by Mize and Ladd (1988) was used to assess each child's social strategies in hypothetical situations. For the third measure, the teacher of each child competed a likert-type rating scale of 16 dimensions concerning the child's functioning with peers during the last observation period. Finally, the observers completed the Baumrind Preschool Q-Set (Baumrind, 1968) to rate the child's prosocialness, gregariousness, and aggression.

The forty-eight children were divided into three groups based on their age when they were first observed. The 13-to-15-month old children were in Group 1 (n=13). Group 2 (n=17) was comprised of the 16-to-18-month old children, and Group 3 (n=18) children were between 19-and-23-months. The authors computed the frequencies and proportions of different types of play for the different groups. In addition, multivariate repeated measures analyses of variance were used to compare the play behaviors across the six observational periods. The data indicated that the proportion of each type of play changed over time for each of the three groups. The authors used ANOVAs (univariate analyses of variance) and Scheffé post hoc measures to determine the direction of age change for each play form. The data showed that parallel play decreased over time. However, the proportion of simple social play did not change during the study. Reciprocal play, cooperative pretend play, and complex pretend play increased throughout the study. More than half of the 48 children engage in reciprocal social play by 13-to-15 months, cooperative social pretend play by 30-to-35 months, and complex social pretend play by 42-to-47 months.

Correlational analyses were used to examine the relationships between the frequency of play forms and the four measurements of social competence. Children who showed more reciprocal play at 13-to-23 months also engaged in a greater proportion and earlier emergence of social pretend play and were rated as more gregarious, more prosocial, and less aggressive at 30-to-35 months. Conversely, children who engaged in more parallel play at 13-to-23 months were rated as less prosocial and more aggressive at 30-to-35 months. In addition, children who engaged in more frequent cooperative social

pretend play at 30-to-35 months were rated as more gregarious, more friendly. more prosocial, less hesitant, and having less difficulty with peers at 44-to-60 months.

Howes and Matheson (1992) concluded that their longitudinal findings partially supported their hypothesis that play forms develop in a predictable sequence and are related to social competence. All 48 children participated in social pretend play after reciprocal play. Seventy-five percent of the children who engaged in social pretend play developed play types sequentially. Some of the children were not observed before the age of 23 months, therefore it is likely that the earliest peer play was not sampled for some of the children. Most of the children developed play either before or during the age intervals suggested by Parten (1932). Since there was a strong relationship between peer play and social competence measures, peer play may serve as one indicator of social competence.

Howes and Matheson (1992) were concerned that only 80% of the children were observed to be engaged in social pretend play. They speculated that the poor quality of some of the child-care centers may have hampered the development of social pretend play in the children. Therefore, they conducted a second study to replicate their sequence of peer play findings. Two groups of children participated in this study. The first group was comprised of 259 children, 125 girls and 134 boys, between the ages of 10 and 59 months. The second group consisted of 48 children ranging in age from 10 to 60 months.

The first group of children (n = 259) was enrolled in 45 different child-care centers. The Early Childhood Environmental Rating Scale (ECERS) (Harms & Clifford,1980) was used to evaluate the classrooms the children attended. Components of the classroom that were evaluated included the ratio of children to adults, average group

size in the classroom, and developmentally appropriate activities. The ECERS indicated that the children (n=259) were enrolled in daycare programs that were minimally adequate. The second group of children (n=48) were enrolled in programs that were rated better-than-average according to the ECERS.

Similar procedures were used for observing the peer play of the children as were used in the first longitudinal study reported in this research, except only one observer watched each child for a total of 20 minutes and recorded the types of play observed. Other measures of social competence were not collected. Frequency and proportion of different play types were recorded for different age levels in the two groups.

An ANOVA and post hoc Scheffé tests were used to compare the different play types according to the age of the children in the two groups. The data indicated that the proportion of parallel play decreased with age and that other types of play including simple social play, reciprocal play, cooperative social pretend play, and complex social pretend play increased with age.

The play behaviors of randomly selected children from both groups were compared using a MANOVA (multivariate analysis of variance). At the same age intervals, children from the minimally adequate daycare centers participated in more parallel play at each age interval than did the children from the better-than- average daycare centers. During ages 10-to-12-months and 19-to-23-months, children from the better-than-average day care centers engaged in a higher frequency of simple social play. During 13-to-15-months and 36-to-41-months, the same children engaged in more reciprocal play. At 30-to-35-months and 54-to-60-months, the children from the better-

than-average daycare centers had a greater proportion of complex social pretend play than the children from the minimally adequate day care centers.

Howes and Matheson (1992) concluded that the proportions of different types of peer play emerged as a product of the child-care setting. Children enrolled in minimally adequate classrooms engaged in less complex peer play and developed more sophisticated types of peer play at a later age than did children who attended better-than-average daycare centers. The authors also found that the social competence of children may be assessed by observing their play with peers in the context of their child care setting.

Social Development and Friendships of Young Children with Disabilities in Mainstreamed Settings

The social skills and interactions of young children with disabilities are a concern for families and educators (Buysee, 1993; NAEYC, 1996b). Often children with disabilities have social problems and are at risk for peer rejection (Odom, McConnell, & McEvoy, 1992). From the inception of early childhood special education, the social competence of young children has been examined in self-contained, experimental, and mainstreamed educational environments (Cavallaro & Porter, 1980; Sainato & Carta, 1992; Schnorr, 1990).

Cavallaro and Porter (1980) investigated social interactions and peer preference in a mainstreamed preschool classroom. They believed that sociometric instruments were not indicative of the behavioral processes that children use to attain and maintain peer relationships. Specifically, they were interested in the nonverbal communication that

children use, such as eye gaze, during peer play and the physical proximity involved in parallel play.

Twenty children, 11 males and 9 females, enrolled in an experimental preschool classroom participated in this study. The children were between the ages of 54-to-89-months and were from low to middle socioeconomic backgrounds. IQ scores of the children ranged from 45 to 122 on the Stanford-Binet Intelligence Scale (Form L-M) (Terman & Merrill, 1973). Seven of the children were diagnosed as having developmental delays based on language, motor, cognitive, or learning problems. The average IQ score for the children with developmental delays was 64 compared to an average IQ score of 99 for the typically developing children.

Observations were conducted in the classroom and in an outdoor play area. The children were observed daily while they participated in free choice of centers including painting, shelf toys, books, puzzles, music, and workbench. A second observation took place during outdoor play time in which the children had access to outdoor toys such as wheel toys and balls. The teachers were asked not to initiate social contact with the children, but were allowed to respond to social contact.

Four types of behavior were recorded: mutual object manipulation, parallel play, proximal eye gaze, and distal eye gaze. Mutual object manipulation was defined as a child having physical or eye contact with the same set of toys as another child. Parallel play was defined as a child having physical or eye contact with the same set of toys within one meter of another child. Proximal eye gaze involved a child watching another child within two meters of proximity. A child was considered to be exhibiting distal eye gaze when he/she watched another child from a distance of two meters or more.

On each day, two or three of the twenty children were observed. The designated target children were observed one time a day for either play or gaze behaviors for a ten-minute period. The observer maintained a distance of two meters from the target children and watched in ten-second intervals and recorded the presence or absence of the play behaviors. The names of the other children involved with the target children were recorded. Each child was observed two to four times for play categories and for eye gaze. Interrater reliability was established prior to the data collection. The two observers had reliability coefficients of .91 to 1.0.

The number of intervals that each child exhibited the play or gaze behaviors was summarized by means and standard deviations. The data comparing the children who had developmental delays to the typically developing children were analyzed using ANOVAs. The typically developing children participated in proximal gaze behaviors directed toward other typical developing children more frequently than they did toward the children with developmental delays. The children with delays initiated and received more distal gazes from other children with developmental delays as compared to typically developing children. Typically developing children participated in more parallel play with other typically developing children more often than with children with delays. Conversely, children with developmental delays participated in more parallel play with other children with developmental delays more than did the typically developing children. No significant differences were found for either typically developing children or children with developmental delays on the mutual object-manipulation category.

Cavallaro and Porter (1980) suggest their data indicate that the children selected playmates with similar cognitive functioning as themselves and that the

preferences of the children were shown in their eye gaze and parallel play. They concluded that the ability to engage in complex and social play depends on the cognitive skills of the children and, as such, children selected playmates based on recognizable cognitive skills inherent in social play. Cavallaro and Porter also stated that physical mainstreaming alone does not result in the complete social integration of typically developing children and children with developmental delays.

In a study that focused on peer interactions in mainstreamed versus self-contained classrooms, Guralnick and Groom (1988) compared the peer interaction and cognitive skills of children with developmental delays while in their self-contained early intervention classroom setting and in mainstreamed settings with typically developing peers. They believed that typically developing children could have a positive impact on the peer relationships of children with developmental delays in the mainstreamed settings.

The participants were 16 male children with developmental delays and 24 typically developing male children. The children with developmental delays were between 49-to-59-months of age and they had been diagnosed with chromosomal disorders, perinatal disorders, and delays related to postnatal trauma. The mean IQ of these children was 71.73 (range 65-86). The children with developmental delays attended self-contained early intervention classrooms and had no prior experience in mainstreamed programs. The typically developing children were recruited from local public and private nursery schools by the researchers to participate in the mainstreamed setting. The 24 typically developing children were divided into a younger and older group. The younger group was composed of three-year-olds and the older group of four-

year-olds. The mean IQ was 110 for the older group and 106 for the younger group of children.

The children with developmental delays were first observed in the experimental mainstreamed setting and then in their self-contained early intervention classrooms. The mainstreamed setting consisted of eight play groups composed of three, 3-year-old, typically developing children, three, 4-year-old, typically developing children, and two children with developmental delays. The play groups operated five days a week, two hours a day, for four weeks in a university-based laboratory classroom specifically designed for preschoolers. The children participated in typical preschool activities including circle time, music, art, snack, and story and were supervised by a teacher and a graduate assistant.

A 50-minute free-play period was held during each experimental mainstreamed play group session for four weeks. During this time, each child was videotaped for a total of 100 minutes (ten 10-minute sessions). Only the last four videotaped play group sessions were viewed, analyzed, and used to compare the social behaviors of the children with developmental delays to their social behaviors exhibited in the self-contained setting.

Three weeks after each child with developmental delays participated in the mainstreamed play group, he was observed in his usual self-contained early intervention setting . The children were in the self-contained setting two and a half hours a day, four to five days a week. The classroom had similar toys and equipment as the experimental mainstreamed play groups, but only children with disabilities attended these classrooms. During free play time, two observers watched and coded the social and play interaction of

each child. No videotaping was done. Each child was observed for 40 minutes over five to eight days.

Two instruments were used to code social behaviors from the videotapes of the mainstreamed setting and live observations from the self-contained setting. The observers watched the videotape or live observation for 10-seconds and recorded the behaviors as absent or present for 5-seconds. The observers used a scale designed to measure social participation and cognitive play (Rubin, Maioni, & Hornung, 1976). The scale consisted of categories of social participation (solitary, parallel, and group) developed by Parten (1932) and categories of cognitive play (functional, constructive, dramatic, and games with rules) based on the work of Smilansky (1968). The second scale used by the observers was based on the work of White and Watts (1973) and measured eleven social behaviors (e.g., gains the attention of a peer, leads a peer in an activity, imitates a peer, expresses affection to peer). All observers were trained to use the two instruments and achieved 80% interobserver agreement on the two scales before data collection. Reliability was calculated to be 89% for social participation, 95% for cognitive play, and 92% for social behaviors. Interobserver reliability for the live observations in the self-contained setting was 89% for social participation, 95% for cognitive play, and 85% for individual social behaviors.

The peer-related social interactions of the children with delays while in the two settings were compared. A MANOVA was used to compare the social participation and cognitive play of the children in the self-contained and mainstreamed experimental settings. The children with developmental delays had higher frequencies of adult-

directed behaviors in the self-contained setting, while the same children had a higher proportion of child-directed constructive play in the mainstreamed setting.

A separate ANOVA was conducted on the individual social behaviors of the children. The children with developmental delays had twice as much positive social interaction in the experimental mainstreamed setting compared to the self-contained setting. However, they also had significantly more negative social interactions in the mainstreamed setting. Social behaviors associated with peer-related social competence such as leading a peer and following a lead were significantly higher when the children with developmental delays were in the experimental mainstreamed setting compared to when they were in their self-contained setting. The typically developing children in the mainstreamed setting had a higher frequency of social participation and cognitive play as well as peer related social behaviors compared to the children with development delays. Overall, the children with developmental delays in the experimental mainstreamed setting were more socially interactive.

Guralnick and Groom (1988) concluded that the higher frequency and quality of play and social interactions of the children with developmental delays in the mainstreamed setting was a result of the interactions established by the typically developing children. Observations of the videotape revealed that the peer-related social play of the typically developing children was more frequent and of higher quality than that of the children with developmental delays. Although the children with developmental delays were not chosen as frequently as the typical children as playmates, social interactions between children with developmental delays and typically developing children were frequent. The four-year old, typically developing children were more

socially interactive than either the three-year-old, typically developing children or the children with developmental delays. The authors suggest that the socially advanced older group may have been responsible for the increased level of peer-related social interaction of the children with developmental delays in the mainstreamed setting. They also suggested that the children with developmental delays in the self-contained setting received more adult-directed activity than in the mainstreamed setting even though the teachers were asked to minimize their contact with the children in both settings.

Other investigations have used qualitative rather than quantitative methods to study the social development and friendships of young children with disabilities. Schnorr (1990) used participant observation, field notes, and qualitative analysis of observations to investigate mainstreaming and peer relationships. The study involved a first grade student, Peter, who was placed in a self-contained special education class and was also mainstreamed into a general education first grade class with 23 typically developing students for an hour-and-a-half daily and for all special events. Peter, a student with Down syndrome, spoke in short phrases, and had language that was difficult to understand.

Participant observation and interviewing was used to collect data on Peter's experiences in school. Participant observations occurred once a week for one-and-a half to two-and-a half hours over seven months. Detailed field notes were written immediately after each observation. Informal conversations and open-ended individual interviews with students without disabilities and the classroom teacher also were conducted. Each interview was tape recorded and transcribed verbatim. Data analysis of the observations and interviews was ongoing and Schnorr (1990) discovered the major themes

surrounding friendships were: (a) where you belong, (b) what you do, and (c) with whom you play. The author used these themes to describe Peter's mainstreamed experiences.

Observations revealed Peter talked in response to adults or occasionally to greet familiar students while he did not initiate many verbal interactions with the typically developing children. However, he did show interest in the first-grade teacher as well as many of the students as evidenced by his use of their names and pointing to their pictures. It is important to note that Peter did not participate in the same reward system, same work, or recess with the general first-grade class which limited his interaction and common experiences with the students.

During the student interviews, none of the 23 typical students in the first-grade class mentioned Peter as a friend or playmate. Every other child in the class was mentioned at least one time as a friend or playmate. It appeared that his peers identified Peter as belonging with the special education class. Schnorr (1990) concluded that part-time mainstreaming resulted only in the physical integration of a child, but not true social integration. Peter was not able to use his social skills effectively in building friendships in this part-time mainstreamed setting.

Social Development and Friendships of Young Children with Disabilities in an Inclusive Setting

Even though many young children with disabilities are primarily in self-contained classrooms for early childhood education, there is a movement to place young children with disabilities in inclusive environments. Recent research has shifted to early childhood education in inclusive rather than self-contained or mainstreamed settings

(Odom, 2000). The following are studies that examine the social interactions and friendships of young children in these inclusive environments.

Buysse (1993) explored issues related to friendship of preschoolers with disabilities participating in inclusive preschool programs. The parents and teachers of children with disabilities were surveyed regarding the peer relationships of young children with disabilities. Peer relationships in this study were categorized as mutual friendships, unilateral relationships, or no friendship. Parents and teachers of children with disabilities from twenty-seven community-based settings (e.g., day care centers, private preschools, and Head Start programs) participated in the study. The children with disabilities attended classrooms that were comprised mostly of children without disabilities. The teachers and parents of fifty-eight preschoolers with disabilities of different diagnostic categories (e.g., children with speech/language impairments, mental retardation, emotional disabilities, developmental disabilities, autism, and learning disabilities) between the ages of two and five years were surveyed. No teachers or parents of typically developing children participated in the study.

The instrument used to collect the friendship data was the Early Childhood Friendship Survey (Buysee, 1991) and was filled out by parents and teachers. The survey consisted of closed-and open-ended questions concerning mutual and unilateral friendships of the children. The parents and teachers completed slightly different versions of the survey. For example, parents were asked to identify factors contributing to friendship formation using an open-ended format, whereas teachers were asked to provide information using a close-ended format.

Buysse (1993) used ANOVAs and MANOVAs on the parent and teacher friendship surveys, family demographics, and Battelle Developmental Inventory (Newborg, Stock, Wnek, Guidubaldi, & Svinicki, 1984) scores to determine the incidence of friendships, the relationship between friendship and child characteristics, and factors that facilitate friendship formation. According to parents, 79% of the children had mutual friends, 7% of the children had unilateral friendships, and 10% of the children had no friendships. The teacher surveys revealed different perceptions than the parents. The teachers indicated that 55% of children had mutual friendships, 27% of the children had unilateral friendships, and 15% of the children had no friends. A post hoc analysis using a Tukey test indicated that the main disagreement occurred when the parents reported a mutual friend and the teacher reported no friend. Therefore, parents viewed their children as having more friendships and higher quality friendships than did a child's teacher.

Based on the teacher-identified friendships, children with speech/language disabilities had more mutual friendships than children with mental retardation. The two highest factors identified by parents as contributing to friendship formation were characteristics of the friends (indicated by 32% of the parents) and the opportunity to spend time with other children (indicated by 27% of the parents). Teachers identified multiple factors contributing to friendship formation. Their responses, from most frequently reported, to less frequently reported were a child's characteristics, friend's characteristics, classroom materials, classroom activities, and adult involvement. Child and friend characteristics included age, possessions, personality, adaptability, shared interest, and similarities.

Parents indicated more often than teachers that their child with a disability had mutual friendships. Buysee (1993) suggests that children who are unable to form friendships with peers in preschool were often successful in forming relationships in the neighborhood. Parents believed that the peer's characteristics (e.g., age, possessions, and personality) and the opportunity to spend time together were the most important factors contributing to these friendships. Conversely, teachers believed that the child's characteristics and the peer's characteristics were the most important factors. Based on the information that the parents and teacher provided regarding the children with disabilities who were currently in inclusive classrooms, Buysee (1993) concluded that structuring situations for the children to play together during school activities and matching children who are able to cooperate with each other are important factors in facilitating friendships.

In a study by Hall (1994), information concerning the social relationships of four children with disabilities and eighty-five of their peers without disabilities in four inclusive classrooms was collected over a 3-year period. This study examined the multiple dimensions of social relationships (e.g., proximity, social status, reasons for spending time together) for children with disabilities who were in inclusive classrooms with typically developing peers. The children ranged from three-and-a half-years to seven-years-old. Data were collected on the proximity of the children to each other during free play activities, peer sociometric nominations, and descriptive information from interviews. The children without disabilities were observed during indoor and outdoor free play activities to determine the frequency of their close proximity to the target children with disabilities. The children were observed for nine, 10-minute intervals

of free play. The number of times each peer was observed in proximity to the children with disabilities was recorded.

Sociometric ratings of the children were also collected and were determined by peer nomination. The ratings were collected from children with and without disabilities who identified pictures of the children with whom they wanted to play. Based on the sociometric data, the children in each classroom who received the most peer nominations were considered high social status and the children who received the least number of nominations were considered low social status in this study.

The children who identified children with disabilities by peer nomination were interviewed and asked the reasons they spent time with the child with disability. The four teachers were also asked their opinions concerning the reasons that children without disabilities spent time in close proximity to the students with disabilities. In addition, students without disabilities and teachers were interviewed to provide a description of the social relationships of the four children with disabilities.

Results over the three-year period indicated that the percentage of time spent with a child with a disability was between 10 to 28% of the intervals for each child without a disability who was observed to be in close proximity to the target child. From the sociometric activity, two children with disabilities were rated by peers as having middle social status, one child with a disability was rated as having low social status, and one child with a disability was rated as having high social status. Only six out of fourteen children who nominated children with disabilities in the sociometric activity also were observed in close proximity to them.

In the interviews the children without disabilities discussed their reasons for spending time with the children with disabilities. Their reasons included: (a) play, (b) to share specific toys or activities, or (c) the child was a friend. The teachers provided other reasons for the interaction: (a) personality types, (b) sharing activities, and (c) parental influence. None of the four teachers mentioned friendship as a reason, even though 4 of the 19 children without disabilities interviewed described the child with a disability as a friend.

The results indicated that children with disabilities received positive peer nominations even though they did not spend much time in proximity with their typical developing peers during class activities. Hall (1994) concluded that even though friendships naturally occur in inclusive classrooms among children with and without disabilities, there might be benefit in supporting these relationships through a structured social skills program involving both children with and without disabilities.

Peer interactions and social acceptance of elementary-age children with severe disabilities in an inclusive school were investigated by Evans, Salisbury, Palombaro, Beeryman, and Hollowood (1992). Eight students with severe physical disabilities and a randomly selected subgroup of eight typically developing peers who were matched to the children with disabilities by gender participated in the study. The children were between the ages of five to eight-years-old and were in four different inclusive classrooms, kindergarten through second grade. The four teachers in this study worked in teams composed of a general education teacher, special education teacher, and educational assistant. An inservice prior to the study concerning curricular adaptations and

instructional practices for inclusion was provided to the teachers, but no special suggestions were made regarding social interaction or peer acceptability of the students.

Three measures were used to ascertain peer interactions and social acceptance of the children with disabilities and the comparison children without disabilities. These included: (a) rating of the social competence of the children using the Assessment of Social Competence Scale (ASC) (Meyer et al., 1985), (b) classroom observation of coded social interactions, and (c) sociometric analysis as determined by a peer nomination technique.

The ASC is a criterion-referenced assessment that measures eleven social behaviors and allows all behaviors to be considered effective if they meet the requirements of the social interaction. The ASC for each child was completed through interviews with the teachers and parents regarding each child's social behaviors. Research assistants conducted classroom observations over a six-month period to gather data on the social interactions of the students with disabilities and the comparison children without disabilities. They used an observational coding system that identified social interaction behaviors (e.g., physical aggression, verbal aggression, conflict resolution, talk, and play). Sociometric data were collected by using a peer nomination technique that involved showing pictures of each child to their classmates and asking "Do you play with him/her?" (play with identification) and " Is this person your friend?"(friend identification).

Data from the ASC, peer sociometric rating, and classroom observations were quantified and analyzed by ANOVAs and a Spearman rank-order correlation. Information collected by the ASC indicated that the children with disabilities scored

significantly lower on social competence than the matched subgroup of typically developing peers. However, results of the sociometric nominations of the children indicated that three of the children with severe disabilities received among the highest acceptance scores in their inclusive classrooms, three children received a few nominations, and two students with severe disabilities did not receive any nominations. The subgroup of typically developing peers received several to a few nominations. Peers were more likely to consider children with severe disabilities to be their friends than their playmates based on the two questions. For the subgroup of typical children, the friend identification matched closely with the play with identification. These findings led Evan et al. (1992) to conclude that the typically developing peers considered the children with disabilities to be friends even if they did not play with them.

The classroom observations indicated that children with disabilities received significantly more interactions from their peers than they initiated while the typically developing comparison children had a comparable number of initiation and responses. In addition, the children with disabilities initiated and received more specific types of interactions (e.g., play, attention seeking, and physical affection) compared to the typical peers. However, the interactions initiated and received by the students with disabilities decreased over the six-month period of the study.

Evans et al. (1992) concluded that the most significant finding of the study was that the social acceptability of children with disabilities is not necessarily a good indicator of social competence or the occurrence of social interactions. Social acceptance determined by peer sociometric ratings were not necessarily lower for the children with disabilities compared to their typically developing peers in the inclusive classroom.

However, it is possible that there was a distortion in the perception of the children in that even the typically developing children who reported not playing with the children with disabilities identified them as friends. In addition, the social acceptance ratings of the children with disabilities were not necessarily related to their level of social competence as determined by the ASC or their observed number of social interactions in the classrooms. The students with disabilities consistently scored lower in social competence and had less observable reciprocal social relationships when compared to their peers in the same inclusive setting.

The natural spontaneous peer interactions of three children with profound disabilities and three children without disabilities between the ages of 3-to-5-years in a full-inclusion preschool was studied by Hanline (1993). The children were observed during supervised indoor and outdoor play during an eight-week, full inclusion summer program at a year-round preschool. Structured interventions to promote social interactions among children with and without disabilities were not implemented in this study, although a major emphasis of the center's curriculum was to promote social interaction among the children. Teachers at the preschool were told not to prompt or reinforce social interactions during data collection.

Each of the six children were observed in 5-minute intervals for a total of 480-minutes during indoor center time and outdoor play. Observations were conducted for eight weeks by two observers who used an interval rating system. During the 5-minute observation session, each behavior in the spontaneous peer social intervention that involved the target child was recorded. The two observers simultaneously observed and recorded the students' behaviors.

The social behaviors recorded were initiations, responses, and termination behaviors. Initiations include vocalizations or physical movement directed toward a peer and responses were social behaviors emitted within three seconds following another child's social behavior. Termination behaviors indicated the ending of interactions such as moving away or two consecutive no response behaviors. Positive social behaviors (e.g., vocalization, smiling, and sharing of toys) and negative social behaviors (e.g., hitting, whining, and grabbing toys) that initiated an interaction, terminated an interaction, or responded to the behavior of another child during an ongoing interaction were recorded. Idiosyncratic communicative behaviors (e.g., squealing, head shaking, and falling asleep) of the children with disabilities also were considered to be social behaviors.

Descriptive statistics were used to present the frequencies of social behavior of the children with and without disabilities (Hanline, 1993). The data indicated several similarities and differences concerning the quality of the interactions of the typically developing children and the children with profound disabilities. The three subjects with disabilities had a number of interactions during the observation period of 480 minutes (332, 224, and 498 interactions respectively), but the typically developing children had a higher number of social interactions during the same time period (an average of 1088 interactions). A small proportion of these interactions were negative for the children with and without disabilities. The majority of social interactions of the three children with disabilities were initiated by their typically developing peers, 79%, 94% and 67% of the time, respectively.

When children with disabilities initiated an interaction, it was followed by a positive response from typically developing peers 35% of the time. When the typically developing children initiated an interaction, it was followed by a positive response 48% of the time from the children with disabilities and followed by a positive response 58% of the time from the typically developing peers. Children without disabilities followed a no response interaction from a peer with disabilities with a positive response over 90% of the time, but responded to no responses from peers without disabilities only 31% of the time.

Because the frequency of positive responses was low for the children without disabilities when they received initiations from children with disabilities, Hanline (1993) suggests that the children without disabilities did not correctly read the social initiations of the children with disabilities and therefore responded less frequently. Even though the children without disabilities might have had a difficult time reading the social cues of the children with disabilities, they still persisted in their interactions with them as indicated by the high number of positive responses to the lack of responses from the children with disabilities. The children in this study, as young as 3-to-5 year olds, distinguished that the children with profound disabilities needed more time and encouragement to respond compared to their typically developing peers (Hanline, 1993).

Even though the three children with disabilities in Hanline's study experienced difficulty initiating interactions with their typically developing peers, they had some success participating in social interactions with these peers. These results indicate the possibility of positive social interaction among all children in an inclusive environment. Hanline (1993) suggests that additional research is needed to further verify whether or

not inclusive settings are effective learning environments for young children with profound disabilities. She maintains that further research should focus on the identification of interventions that optimize the social integration and learning for children with disabilities in the inclusive setting.

Studies have shown that even though typically developing young children may identify children with disabilities as friends, they may not be spending much time with them in close proximity or socially interacting (Hall, 1994; Evan et al., 1992). Furthermore, children with disabilities have difficulty initiating successful interactions (Hanline, 1993). Buysee (1993) has identified several factors that are related to successful friendships of young children with disabilities in inclusive classrooms. These include the opportunity to play together, child's characteristics, classroom activities, and adult environment. Further research is needed to ascertain interventions that are appropriate to facilitate social interactions in inclusive environments.

Intervention Strategies Used to Improve Social Interaction of Children

Beginning in the early 1980s, children with disabilities were first integrated into educational settings with children without disabilities. This inclusion led special education professionals to recognize the need for intervention strategies designed to increase the social interaction of all children in these environments. Researchers indicate that children with disabilities do not play and/or interact as frequently as their typical peers when they are in the same setting (Buysee, 1993; Cavallaro & Porter, 1980; Guralnick & Groom, 1988; Hall, 1994; Hanline, 1993; and Schnorr, 1990). Interventions

that have been investigated to increase this interaction are categorized into three major areas: (a) environmental arrangement, (b) teacher facilitation, and (c) peer mediation.

Environmental Arrangement

Arranging the environment by specifically grouping children and changing the structure of activities to increase the social interactions of children with and without disabilities are considered to be environmental methods. Researchers indicate that the grouping of children with disabilities in specialized self-contained educational settings and integrated settings impacts the social interactions of the children in the groups (DeKlyen & Odom, 1989; Jenkins, Odom & Speltz, 1989).

Jenkins et al. (1989) investigated the effects of the heterogeneous grouping of children to improve the social integration of children with and without disabilities in segregated and integrated preschool classrooms. The participants were 72 preschool-children from the ages of three-to-six years. Fifty-six of the children had mild or moderate disabilities and 16 were typically developing children. The children with disabilities were administered the standardized tests Uniform Performance Assessment System (White, Haring, & Edgar, 1978), Peabody Developmental Motor Scales (Folio & Fewell, 1983), Preschool Language Scale (Zimmerman, Steiner, & Pond, 1979), and the California Preschool Social Competency Scale (Levine, Elzey, & Lewis, 1969). The tests were given to assess performance across developmental domains (e.g., preacademic skills, motor skills, language development, and social competence) at the beginning and end of the school year. The children without disabilities were screened with the Denver Developmental Screening Test (Frankenburg, 1978).

The study was conducted in six classrooms at the Experimental Education Unit of the University of Washington. Two of the classrooms were segregated and each contained 12 students with disabilities. Four of the classrooms were integrated and contained 8 students with disabilities and 4 typically developing students.

Half of the children in the study participated in a social interaction group. The children in two of the integrated and one of the segregated classrooms received social interaction instruction and the children in the other three classrooms participated in child-directed play as part of the curriculum. The social interaction instruction consisted of a 30-minute period each day in which higher functioning students were grouped with lower functioning students for play activities. The teachers in these groups modeled appropriate play behavior and prompted social interaction as necessary. Teachers were instructed to reduce their prompting when the children were socially interacting. In the child-directed play condition, the 30-minute play periods occurred with no specific grouping of the children. The role of the teacher in this play group was to extend the activities of the children, but not direct them.

Observations of the children with disabilities began after the two experimental play groups were implemented in the classrooms for three months. Observers used a probe system to record each child's play for a minimum of three weeks. The observers watched a child for 2 seconds, recorded his/her behavior for 4 seconds, and then moved on to the next child on the roster. Each child with a disability in the class was observed at least 10 times per day, with a minimum of 150 observations collected per child. Five behavioral categories of social participation were recorded (e.g., isolate/unoccupied, proximity, interactive play, negative interaction, and teacher interaction).

Data analysis, using a repeated measures MANOVA, found several significant group and treatment effects. Overall, children with disabilities participated in more isolate/unoccupied play in the integrated classrooms compared to the segregated classrooms. However, they participated in more isolate/unoccupied play in the child-directed condition compared to the social instruction condition in each classroom. Children with disabilities participated in less isolate/unoccupied play as the year progressed in both conditions. The combination of the social interaction treatment and segregated program produced the most negative interactions among children with disabilities, but negative interactions were low across all conditions. There was more interactive play in the integrated classrooms among the children with disabilities and typically developing children who received the social interaction instruction. The children with disabilities in the social interaction condition scored higher on the year-end standardized tests for social competence and language development.

Jenkins et al. (1989) concluded that their findings indicate that the social interaction intervention provided to the heterogeneous play groups increased the interactive play among the children with and without disabilities in the integrated classrooms. They suggest that the lower functioning children in the groups may have been exposed to a more linguistically rich environment that offered more opportunities for talking and listening. The results of this study indicate that arranging the environment by heterogeneously grouping children combined with instructing the children to play together, has the potential to increase the social integration of all children and may result in an improvement in the social competence and language of the students.

In a study focusing on the impact of activity structure on the social interactions of children in integrated play groups, DeKlyen and Odom (1989) predicted that children would interact more with each other when activities were structured and that the rate of teacher-child interaction would not be related to the structure level of the activity. Structure was defined as the degree to which the theme of play, roles of participants, and other rules governing play were stipulated by the teacher to facilitate peer interaction. Teacher-child interaction was defined as a child talking or nonverbally communicating with the teacher. Qualifiers of this interaction involved the teacher looking at the child, saying the child's name, or referring to the activity in which the child was engaged.

The children in this study were thirty-six preschool children between the ages of 43-to-76-months. Eight of the children were typically developing and 28 of the children had mild-to-moderate disabilities. The children with disabilities had language disorders, mental retardation, behavior disorders, health impairments, or physical disabilities. There were 19 boys and 9 girls in the group of children with disabilities and 4 boys and 4 girls in the group of children without disabilities. In a pre-assessment, the children with disabilities scored lower on the California Preschool Social Competence Scale (Levine, Elzey, & Lewis, 1969) compared to the typically developing children and were considered to be less socially competent.

The study was conducted in three classrooms in a laboratory school at the University of Washington. Two of the classrooms were integrated with eight children with disabilities and four typically developing children. The nonintegrated classroom contained 12 children with disabilities. Three different play activities were used each day in the classrooms. These activities were from the *Integrated Preschool Curriculum*

(Odom et al., 1988) and were typical preschool activities (e.g., water table, finger-paint, building materials, puzzle games) designed to increase peer interaction among children with and without disabilities. The activities involved a heterogeneous grouping of four children in which more socially competent peers were grouped with less socially competent children in both the nonintegrated and integrated classrooms. Throughout the duration of the study, children stayed in the same small play group and moved from one activity to another.

Over a two-month period, the children participated in 25 different activities. They played using one activity for 15-minutes and then moved to a different activity for another 15-minute session each day. The play groups rotated through the activities until each group participated in three activities twice within a three-day period.

Data collected included the interactive behaviors of the children and teacher ratings of the structure of each activity. The Social Interaction Scan (SIS) from the *Integrated Preschool Curriculum* (Odom et al., 1988) was used to record each child's interactions with peers and the teacher. The SIS is an observation system that allows a child to be observed for brief intervals several times a day. Behaviors coded on the SIS include: interaction with peer, negative interaction with a peer, proximal play, unoccupied/isolate, and interaction with the teacher. Each child was observed for 2 seconds, his/her behavior recorded, and then another child was observed. This process was repeated until all twelve children had 10 samples of behavior in 12 minutes. Mean interobserver agreement on the observations was 87% between two observers.

A classroom teacher, who was unaware of the hypotheses of the study, rated the 25 play activities according to the amount of structure each activity involved. The rating

was based on the conceptualization of interactive tasks by Eckerman and Stein (1982). The teacher rated the 25 activities from 1 (low structure) to 4 (high structure) based on the following components: defining what the children can and can not do, number of tasks to the accomplish in the play activity, theme of play, roles of participants, turn taking, handling of interruptions, communication, and changing of theme. The activities were also rated by an observer and resulted in an 88% interrater agreement with the teacher.

A 2 X 4 repeated measures ANOVA, (disability versus typically developing x level of structure) was used to test the hypothesis that increased structure was related to more peer interaction. The activity structure was found to be significantly related to peer interaction for both the integrated play groups and the nonintegrated play groups. Children interacted more during activities that were more highly structured. Furthermore, nine of the 28 children with disabilities who scored the lowest on the California Preschool Social Competence Scale (Levine, Elzey, & Lewis, 1969) had significantly greater peer interaction in the structured activities.

A second repeated measures ANOVA measured the relationship between the structure of the activities and the frequency of teacher interaction. The structure of the different play activities did not have a significant effect on the teacher interaction with the children. In the integrated classroom, the teacher interacted more with the children with disabilities than with the children without disabilities regardless of the structure of the activity. In addition, total peer and teacher interaction scores for each child were found to be negatively correlated. That is to say, when children interacted with their peers more, they interacted with their teacher less.

The amount of structure in the play activities was positively related to positive peer interaction. DeKlyen and Odom (1989) concluded that the more structured activities had the greatest impact on the children with the lowest social competence scores. They also found that peer and teacher interaction scores for each child were negatively correlated in that the more frequently the child engaged in peer interaction the less the child interacted with his/her teacher. DeKlyen and Odom (1989) suggest that frequent teacher interactions may actually interfere with peer interactions. The authors also maintain that the children who were the least socially competent required the most involvement from the teacher and suggest that high-structure activities may be the most appropriate social intervention for young children with disabilities. Children with more severe social skill deficits may benefit from the most structured activities.

In another study, Guralnick, Connor, Hammond, Gottman, and Kinnish (1995) examined the immediate effects of integration on the social interactions and social integration of preschool children with and without disabilities. The authors hypothesized that the more advanced play skills of typically developing children in an integrated setting would be more stimulating and socially demanding than being in a self-contained setting for children with disabilities.

The study included 72 unacquainted children who were brought together to form 12 play groups containing six children. The chronological age range of the children was 4-years and 4-months to 5-years and 6-months. All participants were Caucasian boys. Typically developing children were included in the study if they scored between 90 to 130 on the Wechsler Preschool and Primary Scale of Intelligence (WPPSI-R) (Wechsler,

1989) and children with disabilities were included if they scored between 52 to 80 on the WPPSI-R.

Three of the play groups were comprised only of children with disabilities and three of the play groups contained only typically developing children. The remaining six play groups were integrated groups containing four typically developing children and two children with disabilities. The children in the play groups were matched for chronological age, cognitive abilities, language, adaptive behavior, behavior problems and family demographics. The groups were videotaped and met every day for two-and-a-half-hours over two weeks for a total of 10 sessions. Observers recorded the social and play interactions of the children. In addition, peer sociometric ratings were obtained from the children in the play groups.

A teacher and assistant in the laboratory playroom supervised the playgroups. The children participated in a series of group and individual preschool activities including circle time, music, art, snack, and story. The teaching staff encouraged social and play interactions except during free-play periods when they limited their prompting. The children's social interactions were videotaped three times the first week and three times the second week during the free play period. Each child was videotaped for a total of six 10-minute sessions for a total time of 60 minutes over the 2-week period for each play group. The twelve play groups were conducted over a 4-year period.

Five observers viewed the tapes in 10-second intervals and recorded the categories of play using a modified scale developed by Rubin (1985). This scale contained Parten's (1932) categories of social play (e.g., solitary, parallel, and group) and Smilansky's (1968) categories of cognitive play (e.g., simple constructive, dramatic, and

games with rules). In addition, individual social behaviors were recorded when the videotapes were reviewed a second time. The Individual Social Behavior Scale (White & Watts, 1973) was adapted and used to record 34 categories of social behaviors of the children as they occurred on the videotapes (e.g., seeks attention of peer, uses peer as a resource, leads in peer activities, imitates a peer, and expresses affection toward a peer).

Peer sociometric ratings were collected by asking all of the children to categorize photographs of their peers in their playgroups. Each child placed the photographs into one of three boxes representing: children you really like to play with a lot, children you "kinda" like to play with, and children with whom you don't like to play.

Interobserver reliability was obtained for 25% of the videotapes during the study. Interobserver reliability was 91% for the cognitive play categories, 86% for social participation, and 80% to 96% for the social behaviors observed on the videotapes.

A series of group (developmentally delayed, typically developing) X setting (mainstreamed, specialized) X time (first week, second week) mixed-model ANOVAs were conducted. Analysis of the data indicated that setting had an effect on the level of play of the children. All of the children in the self-contained, play group setting were unoccupied (child not playing) twice as much as children in the integrated play group setting.

There also were differences between the children with and without disabilities. Typically developing children engaged in more group play, parallel play, and more active conversation with their peers. On the other hand, children with disabilities engaged in more solitary play and interactions involving adults. The analysis of social behaviors indicated that typically developing children exhibited more interactive behaviors such as

leading peers and responding to peers than did the children with disabilities. Children with developmental delays displayed a higher proportion of negative social behaviors and more of these behaviors were exhibited in the integrated setting. Follow-up analyses of the sociometric ratings indicated that the typically developing children preferred to interact with other typically developing children and children with developmental delays had no preference as to who they interacted with in the playgroup.

Even though children with disabilities showed lower levels of play and social interactions compared to their typically developing peers, they played and interacted more with their peers in the integrated play group than the segregated play group setting. Furthermore, the typically developing children were more interactive in the integrated playgroups. Guralnick et al. (1995) concluded that young children with and without developmental delays are more interactive with their peers in an integrated playgroup setting as opposed to a self-contained play group setting. This finding was apparent within the first week of the play groups. Guralnick et al. (1995) speculated that the range of developmental characteristics of the children in the integrated playgroup setting required the typically developing children to act in a leadership role. The authors recommended that future research endeavors should focus on developing strategies to build on the naturally occurring positive interaction patterns to increase the social interaction among children with and without disabilities.

Teacher Facilitation

Social skills training implemented by adults (e.g., therapists, preschool teachers, teaching assistants) for preschoolers with disabilities has been reported in the literature. LeBlanc and Matson (1995) investigated the generalization and social validity of a social

skills training program for preschoolers with disabilities. Thirty-two children with disabilities from six self-contained special education classrooms participated in the study. The children had mild to moderate developmental delays as determined by their scores on the Battelle Developmental Inventory (Newborg, Stock, Wneck, Guidubaldi, & Svinicki, 1984). A preassessment of the frequency of student social behaviors served as the basis for assigning participating classrooms to either the treatment or control condition in this study. This was done by matching the total number of student social behaviors in one classroom to the social behaviors of students in another classroom. One class was randomly assigned to the treatment condition and the other matched class to the control condition. This process was repeated until all six classrooms were assigned to either the treatment or control conditions. The mean age of the children in the treatment group was 3-years, 9-months and was 4-years, 6-months in the control group.

The treatment group received social skills training in two, one-hour sessions, once a week for six weeks. The treatment group children were instructed on the target behaviors of greeting, requesting a toy, initiating play, and showing toys. Puppets, peer modeling, role-playing, and reinforcement were used in the instruction of these social skills. The social skills training consisted of 15-minutes of a structured group activity in which the target behaviors were explained, modeled, and practiced, and 45-minutes in a play situation in which the social behaviors were reinforced with praise and food. Children who exhibited inappropriate behaviors were sent to time-out for one-minute. Reinforcers and prompting were gradually faded over the six-weeks of the study. The control group did not receive social skill training. They participated in their regular preschool routine with their preschool teachers.

Data collected consisted of observations of the children's social behaviors pre-and post- intervention, teacher ratings of the social behaviors of the children before and after the intervention, and the childrens' behaviors during a generalized situation. Trained observers recorded target behaviors during the pre-intervention, post-intervention, and generalization phases of the study. The recorded target appropriate behaviors consisted of verbal greeting, requests to see a toy, an initiation to play, and showing a toy to a peer. Inappropriate behaviors (e.g., tantrums, aggression, grabbing toys, throwing toys, and refusing to share) also were recorded. Four raters were trained to 90% interrater agreement on the target behaviors prior to data collection. Raters observed each child for 15 seconds and recorded the child's behavior for five seconds for four consecutive intervals. This process was repeated so that each child was observed for five minutes during pre-intervention, post-intervention, and the generalization phase of the study.

To evaluate the social validity of the social skills training, teachers were asked to assess the social behaviors of the children who received and did not receive the training. Randomly selected 5-minute segments of the videotaped play sessions from pre and post-intervention were shown to the 10 preschool and kindergarten teachers. The teachers were told that some of the children in the videotapes had received social skills training. The teachers rated the social skills of the children on a 5-point Likert scale to evaluate the social validity of the intervention. The teachers also evaluated the children on the basis of their appropriate social behaviors (e.g., saying hi, asking to play, smiling, etc.) and their inappropriate social behaviors (e.g., aggression, crying, bullying, etc.).

During a second post-intervention session, two new children with disabilities were brought into the classrooms and the social behaviors of the children were observed

to evaluate for a generalization effect of the intervention. Data were collected on target behaviors for children in the treatment and control conditions, but not for the two untrained children. The same pre- and post-intervention observation procedures were used.

Analyses of covariance (ANCOVAs) were used for each appropriate social skill category (e.g., verbal greeting, request to see a toy, an initiation to play, and showing a toy to a peer). Pretest scores were used as covariates. Children who received the social skills training had significantly more appropriate behaviors compared to the children who did not receive training. There was no significant difference in the inappropriate behaviors for the children in the two groups. ANOVAs were used to assess appropriate and inappropriate behaviors of the children during the generalized situation. In the generalized situation the children who received social skills training exhibited significantly more prosocial behaviors with the new children than the students who did not receive training.

An ANOVA was used to measure the social validity of the intervention as judged by the teachers who viewed the videotapes. There was no significant difference in teacher ratings of the behaviors of the children in the two groups from the pre-intervention versus the post-intervention video. The teachers did not distinguish a difference in the social skills of the children with disabilities before and after the training regardless of the training they received.

LeBlanc and Matson (1995) concluded that the social skills training package was effective in increasing prosocial behaviors of preschoolers with disabilities and that the social skills were generalized to new peers. While, inappropriate social behaviors were

reduced, they were not reduced significantly for the students who received the social skills training. The children with disabilities continued to need prompts to stop inappropriate behaviors throughout the six weeks of the intervention. However, the inappropriate behaviors of the children who did not receive social skills training nearly doubled during the six-week intervention period. The authors suggested that children with disabilities need specific intervention to decrease inappropriate behaviors. Because the teachers who viewed the videotapes were unable to detect social skill changes in the post assessment, the researchers suggest that more research is needed concerning teacher definitions of social skills for young children.

Current research is beginning to focus on the development of social skills within the inclusive classroom environment. In a study that extended the concept of environmental arrangement by using teacher facilitated play groups, Butz (1999) attempted to increase social interaction among preschoolers with and without disabilities in an inclusive preschool. The participants in the study were 16 children who attended a preschool on a university campus. Eight of the children had disabilities that included autism, developmental delay, and cerebral palsy. Eight children without disabilities who were randomly selected from the preschool population also participated in the study.

Four of the children with disabilities and four of the children without disabilities were assigned to a teacher facilitated play group and the other eight children (4 with disabilities and 4 without disabilities) were assigned to a nonfacilitated play group. Teacher facilitation was defined as a teacher who encouraged the social and play interactions among the children using guided participation strategies adapted from the *Integrated Play Groups Resource Manual* (Wolfberg & Schuler, 1992). In the

nonfacilitated play group, the teacher only monitored the children and did not facilitate or prompt any interaction.

The play groups met four days a week for 20-minutes over a four-week period. The theme of the play groups changed weekly according to the theme of the classroom. Themes included snow play, dinosaur toys, and seashore. The playgroups were videotaped during the first and fourth week of intervention. Two observers rated the behaviors of the children using the Social Interaction Observation Scale (SIOS) (Kreimeyer et al., 1991) and the Observer Manual (Antia et al., 1990).

The SIOS categorizes the occurrence of 15 social behaviors (e.g., positive peer interactions, negative behaviors directed to peer, nonplay behavior, solitary play, parallel play, cooperative play, positive linguistic interaction, peer initiations of interaction, child responds positively to peer initiation, child responds negatively to peer initiation, no response to peer initiation, child initiation of interaction, peer responds positively to child's initiation, peer responds negatively to child's initiation, or peer makes no response to child's initiation). The Observer Manual counts the number of positive and negative social interactions (e.g., snatching materials or toys from a peer without asking and receiving permission, shouting, hitting, throwing, pulling, pushing away, giving requests and polite refusals, sharing materials, playing cooperatively, participating in interactive games, and physical signs of affection). In this study, the preschool teachers also used the Social Skills Rating System (SSRS) (Gresham & Elliott, 1990) as a pre-and-post measurement to assess the social competence and problem behavior of the children.

Paired *t*-tests were used to compare 15 social behavior measures from the SIOS during the first and final weeks of intervention. Only two of the fifteen behavior

measures changed over time. Specifically, the number of times the typical peers initiated interaction toward the children with disabilities decreased and the number of times the children with disabilities initiated interactions also decreased. Paired *t*-tests were used to distinguish if there were significant differences between the positive and negative social interactions as measured by the Observer Manual in the facilitated and nonfacilitated play groups. No significant differences were reported between the two groups. A MANOVA was performed using the social skill ratings and problem behavior ratings from the SSRS as dependent variables and play group assignment and disability status (with disability and without disability) as independent variables. No significant group differences were found.

Butz (1999) discussed that the absenteeism of the children in both the non-facilitated and facilitated groups and the short length of intervention may have affected the efficacy of the intervention. She also maintained that the teacher facilitator's involvement may have inadvertently caused the decrease of social interactions among the children in the facilitated group in that the teacher facilitator may have been too intrusive and interfered in the social initiations of the children. Butz (1999) suggested that future research should attempt to determine the level of adult facilitation that is appropriate to establish a supportive environment for the development of social skills for children with and without disabilities.

Different teacher facilitation strategies may produce more effective social interactions between children with and without disabilities. Hyatt (2000) conducted a study comparing proactive and reactive teacher facilitation approaches that were designed to increase social initiations and responses. The purpose of the study was to examine the

level of implementation by teachers of facilitation strategies taught to them and to examine the corresponding social behaviors of the students.

The setting of the study was an inclusive preschool. Three preschool teachers and three groups of eight children participated in the study. Each of the preschool teachers was randomly assigned to one of the three groups of children. The three groups were composed of 4 boys (3 without disabilities and 1 with a disability) and 4 girls (3 without disabilities and 1 with a disability).

One teacher was instructed to use a proactive approach, which consisted of providing the children with direct instruction in specific social skills (e.g., joining in, sharing, waiting your turn, and asking someone to play) prior to and during the play activities. The proactive approach was based on the program *Skillstreaming in Early Childhood* (McGinnis & Goldstein, 1984) that provides a sequential procedure for teaching specific social skills. The proactive teacher was instructed to: (a) discuss the importance of the skill, (b) identify the steps necessary to complete the skill, (c) model the skill, and (d) provide feedback to the children while role-playing of the skill. The second teacher was instructed to use a reactive approach that consisted of: (a) praising children for positive initiations with peers, and (b) praising children for positive responses to peers. The third teacher served as the comparison teacher and was not given any formal instruction.

Teacher and children behaviors were collected in three phases: five days of pre-intervention, eight days of intervention, and four days of follow-up. The teachers supervised the children in a play group for a 10-minute session during each day in each phase. During the pre-intervention phase, the three teachers behaved as they normally

would with the children. During the intervention phase, the individual teachers were instructed to use the proactive approach (Teacher 1), to use the reactive approach (Teacher 2), and to act normally with the children (Teacher 3). In the follow-up phase, all three teachers were instructed to do whatever they felt was best during the play group.

All of the play group sessions were videotaped. The videotapes were viewed at the conclusion of the study and the number of times the teachers performed proactive or reactive strategies were recorded. The frequency of the social initiations and responses of the children also were recorded. A trained observer rated 25% of the video recordings to establish inter-rater reliability.

An ANOVA was used to analyzed the behaviors of the teachers and children in the three phases. The teacher trained in the proactive strategies used one of the four proactive strategies (identifying the steps necessary to complete the skill) more frequently during the intervention phase, but her use of the strategies during the follow-up phase returned to her level of use in the pre-intervention phase. The teacher trained in reactive strategies used both of the reactive strategies (praising children with positive initiations with peers and praising children for positive responses to peers) during the intervention phase and continued to use the strategies during the follow-up phase. There was no change in the behavior of the comparison teacher in any of the three phases of the study.

A series of ANOVAs were used to evaluate the social initiations and responses of the children in the three groups across the pre-intervention, intervention, and follow-up phases. The children in all three groups showed an upward trend in their positive initiations and responses during the intervention and follow-up phases. Hyatt (2000) suggested that the increase of social initiations and responses may have been a natural

result of children spending more time together during the course of the study. In addition, the children in the reactive group had significantly more positive initiations than the children in the group that received no specialized instruction during the intervention and follow-up phases. This may indicate that the intervention provided by the reactive teacher was more effective than the intervention provided by the comparison teacher who provided no specialized instruction.

Hyatt (2000) suggests that the reactive strategy may be easier to implement than the proactive strategy because some parts of the proactive strategy may be perceived by teachers as more difficult to incorporate into an ongoing activity (e.g., role playing a specific social skill). The teacher assigned to use proactive strategies may have viewed proactive social skill instruction as a teaching activity that was separate from the play group activity and therefore discontinued the use of the strategies during the follow-up phase. Hyatt (2000) also concluded that the young children who participated in this study may not have yet developed the cognitive ability necessary to benefit from a proactive approach to teaching social skills.

Peer Mediated Intervention

The use of peer mediated intervention to increase the peer interactions of children with disabilities began in the 1980s. Odom, Strain, Karger, and Smith (1986) investigated the use of single and multiple peers to increase the social interaction of two preschoolers with disabilities in an alternating treatment design. The researchers believed that using multiple peers in peer-mediated interaction might assist in the fatigue effects experienced by only one peer in social skill training.

All six of the children in this study were enrolled in the same mainstreamed classroom. Two of the children had behavior disorders. David was 40 months-old, nonverbal, and communicated with gestures. Margaret was 62-months, exhibited stereotypic motor behaviors, and rarely communicated verbally or nonverbally with her peers. The four typically developing children were divided into two groups. The single peer was a four-year-old girl. The multiple peers were two four-year-old boys and one five-year-old girl. Two teachers prompted the children and rotated between the single and multiple peer conditions in the study.

Before the intervention, the four typical peers received five, 20-minute training sessions from the two teachers. During these sessions, the teacher introduced five social initiation strategies (e.g., play organizers, shares, assistance, affection, and persistence), modeled each strategy, and had the typical peers practice each strategy. After the training session, the children with disabilities rotated through the ten-minute sessions with the single and multiple-peers.

An alternating treatment design (ABAB) was used to compare the efficacy of the single and multiple peer-mediated interventions over four days. Day one was baseline, day two was intervention, day three with withdrawal of the intervention, and day four consisted of the reintroduction of the intervention. During each of the two intervention days, the children with disabilities received both single and multiple peer interventions in separate 10-minute sessions.

During the single-peer condition, one child with a disability was grouped with the single peer and two other classmates not involved in the interaction. During the baseline condition, the naturally occurring social initiations of the children were recorded. During

the treatment condition, one teacher supervising the group cued the single peer to engage the child with the disability in play. The teacher verbally prompted the peer to initiate to the child with the disabilities when no social interaction occurred within 20 to 30 seconds. In the withdrawal phase the teacher instructed the single peer to play with anyone and did not prompt any further social interactions.

In the multiple-peer condition, one child with a disability was grouped with the three peers. During baseline, observers recorded the naturally occurring interaction of the group. During the intervention phase, each of the peers were verbally cued by the teacher to direct social initiations to the child with a disability in two-minute intervals. At the end of the two-minute interval, the peer was allowed to play with anyone in the class. The order in which the three peers were cued to provide peer-mediated interaction was randomized for each session.

Observers used a nine-category recording system to code the social behaviors of the children in 10-second intervals. The social behaviors included play organizer, share, share request, assistance, assistance request, complimentary statement, affection, negative motor-gestural, and negative vocal-verbal. The observers coded whether the social behavior was an initiation or response. The verbalizations of the teachers were audiotaped and their prompts were coded. For 39% of the sessions, two observers simultaneously recorded the social behaviors of the children. Interobserver agreement was analyzed using correlation coefficients and ranged from .76 to .99 for the social behaviors of the children.

The social initiations of the peers and teacher prompts were calculated and charted. During baseline, the social initiations from the single peer and multiple peers to

both Margaret and David occurred at a low rate. During the intervention phase when the teacher instructed the single and multiple peers to play with Margaret and David, the social initiation of these children increased substantially. There was not a substantial difference in the total number of initiations from the single peer versus the multiple peers combined. In the withdrawal phase, the social initiations of the single and multiple peers dropped to baseline levels. When the teacher reinstated the verbal cues to the peers in the second intervention phase, the single and multiple peers exhibited comparable levels of social initiations as was demonstrated in the initial intervention phase.

The social interactions of the two children with disabilities, Margaret and David, were calculated within each of the four phases and charted. The interactions were grouped into social responses and initiation. During baseline, Margaret's social responses occurred infrequently. In the first intervention phase when the teachers prompted the typical peer, Margaret's social responses increased substantially. During the withdrawal of intervention phase, the social responses declined to near zero levels and subsequently increased in the last intervention phases. Margaret's social initiations were unaffected by the intervention and remained low throughout the study.

David showed a slightly different pattern of social interaction during the intervention phases. His social responses increased above baseline levels for both the single and multiple peer conditions. When peer initiations decreased in the withdrawal of intervention condition, David's responses fell to approximately baseline levels, but there was a slightly higher response rate in the single peer condition. When the intervention was reintroduced, David's responses increased to the same level for both the single and multiple peer conditions. During baseline, David rarely initiated interaction. However,

in the first intervention phase his social initiations increased slightly. In the final intervention phase, his social initiations increased in the multiple peers intervention and decreased in the single peer condition.

Evaluating the graphic displays of the nine behavioral categories showed the specific social behaviors that the children exhibited during different phases. Margaret primarily engaged in sharing (74%) and play organizers (23%) during intervention phases. Negative behaviors made up 2% of her behaviors. David primarily engaged in play organizer (27%) and sharing (68%). He requested peers to share 3% of the time. Negative social behaviors represented less than 1% of David's total interactions with his peers.

Odom et al. (1986) maintained that both single and multiple peer mediated intervention may be an effective method to increase the social interactions of young children with behavior disorders. However, the anticipated differences in efficacy between the single and multiple peer interventions did not occur in this study. The single peer intervention was comparable to the combined efforts of the three peers as an intervention. The researchers speculated that the single peer was highly motivated and took pride in doing well for the teacher. In addition, the single peer had a brother with a disability in the class. Her family experience with assisting her brother may have positively influenced her performance in this study.

In addition, David's higher level of social initiations in the intervention compared to Margaret's social initiations could be explained by the severity of Margaret's disability. The peers had to make multiple social initiations to engage Margaret in interactions. The peers also needed more teacher prompts when working with Margaret.

Odom et al. (1986) suggest that the teacher's role is important for the efficacy of a peer-mediated intervention. This is especially true for young children who may lack the social repertoire to independently socially initiate and obtain a response from a child with a disability.

Storey, Danko, Strain, and Smith (1992) studied the long term effects of peer-mediated instruction on the social competence of young children with disabilities. They evaluated the social skills of young children with developmental delays in kindergarten after they received peer-mediated intervention in their previous preschool setting. Six children with mild developmental delays, as determined by the Battelle Developmental Inventory Screening Test (Newborg et al., 1984), who attended integrated kindergarten classrooms participated in this study. The six children with delays (two students in each class) attended three different integrated classrooms at three different schools. Twelve typical peers from their three classrooms were chosen by the three teachers as comparison children.

In the previous school year, the children with delays received peer-mediated instruction to increase their social interaction. This intervention lasted four and-a-half months and consisted of social skill instruction provided to groups of three children. Each child with a developmental delay was grouped with two typically developing peers. Preschool classroom assistants provided verbal instruction to the peers to practice social skills with the child with the developmental delay. The skills taught were getting a friend's attention, sharing, requesting, playing, and complimenting.

A year later in their kindergarten classrooms, the six children with developmental delays and 12 typical comparison children were observed during an indoor free play

situation. An interval observation coding system was used to record when each child initiated, received, or maintained interactions for five-second intervals. Data were collected for a total of five minutes per day over ten days. Only the first interaction per interval was coded.

Descriptive statistics were used to describe the observation results. The percentage of intervals in which the children with developmental delays and the typical comparison children participated in social interactions were charted and compared. There were minimal differences in the number of intervals in which the children with and without delays interacted with other children. The range of intervals was 1% to 3%. There was a wider range in the percentage of intervals (2 % to 26%) in which the children were interacting with the teacher. The children with delays scored in the middle range. The results indicate that the children with delays interacted more during the one-year follow-up phase than in the baseline phase, but that there was some decrease from the intervention phase. Five of the six children showed an increase in the number of peers with whom they interacted in kindergarten compared to the previous school year. Overall, the interaction levels of the children with delays were comparable to the typical developing children in their kindergarten classrooms a year after they received peer-mediated intervention.

Storey et al. (1992) concluded that when children with developmental delays were paired with children without disabilities during social skill instruction, improvement of their social skills was still observed the following school year. This indicates that the training generalized to a new educational setting a year later. In addition, the authors suggested that future research should focus on variables such as maturation and the

change of educational placement that may contribute to the social competence of the children.

In a recent study, Odom et al. (1999) compared the effectiveness of different social interventions to improve the social competence of young children with disabilities. These interventions included peer-mediated, environmental arrangements, child specific, and comprehensive training. The peer-mediated interventions used skilled typically developing peers to teach social skills to children with disabilities. The environment arrangement used in this study involved the grouping of children with and without disabilities in structured play situations. The child specific intervention involved the teacher providing prompts and praising the children who engaged in positive social exchanges. And, finally, the comprehensive intervention approach included elements of all three interventions. A performance-based assessment was used to evaluate the social competence of the participating children.

The participants in this study were 98 young children with disabilities (66 boys and 32 girls). The mean age of the children was 58.5 months at the beginning of the study. Specific diagnoses of the children included mental retardation, behavior disorders, communication disorders, health impairments, and hearing impairments. The children were enrolled in 10 self-contained classrooms and 2 integrated classrooms. The 10 self-contained classrooms were randomly assigned to one of five conditions: (a) control, (b) environmental arrangement, (c) child directed, (d) peer mediated, and (e) comprehensive. The two integrated classrooms were assigned to control and comprehensive conditions. Typically developing kindergarten children participated as peer tutors in the peer mediated and comprehensive classrooms.

The study took place for 55 to 60 days over a six-month period. The teachers in the treatment conditions received an all day workshop on the intervention(s) that occurred in their classrooms. They received procedural manuals with scripted lessons and were visited weekly by the research supervisor.

In the control condition, the teachers were asked to conduct their classrooms as they normally did. In the environmental condition, the teacher organized structured play groups comprised of four to six children with and without disabilities. In these groups, the teacher introduced a play activity and suggested play ideas, but did not prompt any social interaction. The play group lasted between 6-to-10-minutes.

In the child specific condition, children with disabilities participated in social skills groups. In these groups, the social skills were taught by the teachers and included initiating, sharing, agreeing, leading a game, and trying a new way. The training lasted 5-to-10-minutes and the children then participated in the same play activities as the children in the environmental arrangement group.

In the peer-mediated intervention, typically developing kindergarten children participated in ten social skills training lessons that were developed to teach social initiation strategies to the children with disabilities. Types of social initiations included: (a) share, (b) share request, (c) play organizer, (d) assistance, (e) assistance request, and (f) persistence. The typical peers then played with the children with disabilities while the teachers prompted the peers to make social initiations. The teachers gradually reduced the number of prompts until no prompts were needed by the children to sustain social interaction.

In the comprehensive approach, features of environmental arrangement, child specific, and peer-mediated interventions were used. The teacher organized structured play groups for the children with and without disabilities. In addition, the children with disabilities received social skill training from the teacher and the typically developing students received training on the initiations of social interaction with the children with disabilities. The teacher prompted the kindergarten students to initiate social interactions and then faded the prompts once ongoing interactions were observed.

A performance-based assessment of social competence (PASC) (McConnell & Odom, 1999) was used to measure the efficacy of the interventions. The PASC in this study included: (a) direct observation of social interactions, (b) the Observer Impressions Scale (OIS) (McConnell & Odom), (c) the California Preschool Social Competency Scale (CPSCS) (Levin, Elzey, & Lewis, 1969), and (d) peer sociometric rating. For the direct observation component, two observers watched and recorded the social initiations, social interactions, duration of the social interaction, and teacher prompts on laptop computers. They observed each target child for six, 5-minute intervals during four observational periods: (a) a free play period during pre-intervention involving only children with disabilities, (b) a post-intervention phase involving only children with disabilities, (c) a post-intervention phase with children with and without disabilities who participated in the study, (d) and a follow-up phase for the children with disabilities in their educational placement one year later. Interrater reliability ranged from 76% to 85% across the conditions recorded. After the observations, the observers completed the OIS, a 16-item scale, to assess the quality of the interactions of the target child. Interrater agreement on the OIS ranged from 91 to 96%.

The 12 classroom teachers completed the CPSCS (Levin et al.,1969). This is a 30-item scale that was used to assess a child's social competence before and after the treatment conditions and during the follow-up condition. Peer sociometric ratings were collected by showing each child pictures of all the children in the class and asking him/her to sort the pictures into boxes representing liked a lot, liked a little, or did not like. Each child ended up with a peer rating that indicated his/her social status in the classroom based on the picture identification activity. The CPSCS and sociometric peer ratings were collected during pretreatment, post-treatment and follow-up periods.

A 5 (treatment conditions) X 4 (observational periods) repeated measures MANOVA was conducted on the frequency of social interactions, percentage of time engaged in social interactions, and OIS scores. A second repeated measures MANOVA was conducted on the CPSCS and sociometric peer rating scores. When significant effects for the MANOVAs were found, factorial repeated measures ANOVAs were computed for each individual treatment and dependent variable. Effect size was calculated to show the relative effects of the interventions across time.

Observational data indicated no significant differences in the social interactions for the children in the control or comprehensive treatment conditions. Children with disabilities in the environmental arrangement, peer-mediated, and child specific interventions showed significant effects. The children in these conditions increased their social interactions immediately following the intervention, however, their social interactions decreased during the follow up period.

The OIS data indicated no significant effects for the children with disabilities in the environmental arrangement condition or in the control group. However, the children

with disabilities in the child specific and peer-mediated conditions had higher OIS scores following the intervention and in the follow-up phase indicating an improvement in the quality of interaction as rated by the observers. The children with disabilities in the comprehensive condition did not have higher OIS scores post-intervention compared to pre-intervention, but they did have higher scores during the follow-up phase compared to pre-intervention.

The teacher ratings of the social competence of the children based on the CPSCS scores were not significantly different for the children with disabilities in the control group. The children with disabilities in the environmental arrangement and comprehensive conditions had higher social competence scores during follow-up, but there was not a difference found between pre- and post-intervention scores. The child specific and peer-mediated approaches had significantly higher teacher ratings of social competence during the post-intervention and follow-up periods compared to the pre-intervention phase.

Finally, no significant effects were found in the peer sociometric rating from pre-intervention to post-intervention or follow-up periods for the control, child specific, or peer-mediated conditions indicating that the social status of the children with disabilities did not change. In the environmental arrangement group, the children with disabilities had higher peer ratings during post-intervention and the follow-up period compared to their pre-intervention scores indicating improved social status of these children. The children with disabilities in the comprehensive intervention condition showed higher peer rating during the post-intervention period, but this was not sustained in the follow-up period a year later.

Statistical effect size analyses of the measures in the PASC provided a basis of comparison for the changes during the post-intervention and follow up periods. Effect sizes of the social interaction observational data and the OIS measures for the children with disabilities were higher in the post-intervention phase that had children with and without disabilities compared to the post-intervention phase with only children with disabilities. This finding reflects the positive social influence of the presence of the typically developing children.

The environmental arrangement intervention generated the greatest effect size on the social interaction observational data and on the OIS measure in the post-intervention phase with only children with disabilities. There was significant effect size on the OIS measure for the peer-mediated and child-specific conditions during the post-intervention phase that had both children with and without disabilities. The effect size of the teacher rating of social competence based on the CPSCS at post-intervention for the peer-mediated condition was substantially larger than any other intervention. During the follow-up period, the peer-mediated intervention was the only intervention that maintained a greater effect size than the control condition for the children with disabilities.

The comprehensive nature of the performance-based assessment of social competence (PASC) allowed for the investigation of the differential effects of each intervention on different aspects of social competence (Odom et al., 1999). The peer-mediated intervention produced the greatest frequencies of social interaction for the children with disabilities. The child specific and peer-mediated conditions had the greatest effect on the teachers' ratings of the social competence of the children with

disabilities. And finally, environmental arrangement had the greatest effect on peer sociometric ratings for the children with disabilities.

Odom et al. (1999) suggest that teachers should use peer-mediated intervention to positively impact the social skills of young children with disabilities. They also maintain that an environmental arrangement intervention may help children with disabilities participate in play and interact with their peers in a more acceptable manner that results in higher sociometric ratings. However, the comprehensive intervention was found to be less effective than child specific and peer mediated interventions in this study.

Technology to Facilitate the Social Interaction of Children

Recently the National Association for the Education of Young Children (NAEYC) (1996a) has recommended the use of technology to increase the cognitive skills, social skills, and inclusion of children with disabilities. However, some early childhood educators have questioned if young children can benefit from computer activities in the classroom (Bredekamp & Rosegrant, 1994). Others maintain that children, as young as three-years-old, can use the technology successfully in their early childhood classroom (Haugland & Shade, 1994). Brett (1994) maintains that technology provides opportunities for children to practice social skills such as cooperating, helping, turn taking, and negotiating during computer activities. The following is a review of the literature related to the social interaction of young children engaged in computer activities.

Children Without Disabilities

There is evidence that young children display effective social interaction skills during computer activities in the classroom and that they tend to have more social interaction while using open-ended software programs compared to drill and practice programs (Clements & Nastasi, 1988; Haugland, 1992). In addition, young children show positive affect when working on computer activities together as compared to working alone (Perlmutter & Behrend, 1985).

Clements and Nastasi (1988) examined the social competence and cognitive function of young children while they used different software programs. The children who participated in this study were 24 first graders and 24 third graders. The children were randomly assigned to two experimental conditions: Logo software (Terrapin Software, n.d.) which is an open-ended software, or a computer-assisted drill and practice software.

Training sessions in the use Logo and the drill and practice software were provided to the children prior to their participation in this study. The children in each of the two experimental groups were divided into groups of six children working in pairs at three computer stations. The children received 28 sessions of computer training twice a week for 45-minutes per session.

The Logo software was considered to be the open-ended software in this study. The children who used Logo directed the movement of an on-screen turtle to draw different shapes. They first planned their drawing, drew their pictures on a piece of paper, and defined the programming procedure to replicate the picture on the computer.

The computer-assisted drill and practice software involved the children in the use of programs designed to teach aspects of reading and arithmetic. The software programs used in the computer-assisted instruction were directed in nature. They included Math Blaster (Knowledge Adventure, n.d.) and Word Attack (Knowledge Adventure, n.d.).

The assignment of software programs and skill level within the specific software programs were adjusted according to the academic level of the individual children. The children in both intervention groups worked in pairs and their social interactions were observed.

Clements and Nastasi (1988) developed an interval observational assessment to measure the social and cognitive behaviors of the children. These included cooperative work, conflict resolution, self-directed work, persistence, rule determination, and showing pleasure. Each child was observed for a total of 10-minutes for two or three of the 45-minute sessions. The occurrence and nonoccurrence of social and cognitive behaviors were recorded in 10-second intervals using the observational assessment.

In addition, data on the cognitive information-processing of the children in the two experimental conditions were recorded. A scheme developed for categorizing information-processing components involved in problem solving was developed by Clements and Nastasi (1988). The scheme included the following components: deciding on the nature of the problem, selecting performance components relevant for the solution, combining components, allocating resources, selecting a strategy, monitoring solution process, and using external feedback. The information-processing scheme was used to evaluate the conversations of the children during the computer activities. The conversations were audiotaped for 20-to-30 minutes during the two weeks following the

observations of social interaction. The tapes were transcribed and the childrens' statements were categorized according to the type of information-processing component the statements represented.

An ANOVA was performed for each of the social behaviors that had been recorded on the interval observational assessment. Children in the Logo group had significantly more of the following social behaviors: conflict resolution, rule determination, and self-directed work than the children in the computer-assisted instruction group. Children in both experimental groups spent an equivalent amount of time working cooperatively (60% to 70% of the intervals). The Logo group had more incidences of showing pleasure, but the difference was not significant. ANOVAs also were performed on the information-processing components. The students who participated in the Logo group had a significantly higher incidence of: deciding on the nature of the problem, selecting components, combining components, and allocating resources than did the students in the computer-assisted instruction group. On the other hand, the students in the computer-assisted instruction group had higher incidences of: using feedback, performance components, and off-task behaviors.

Even though the children in both groups worked cooperatively, the children in the Logo group showed more conflict resolution. Clements and Nastasi (1988) suggest that the children who worked with Logo continually negotiated and discussed solution strategies. On the other hand, the children who used the computer-assisted instruction software disagreed, but continued to take turns rather than negotiate. The authors suggested that the opportunity to resolve conflict is necessary for the development of social problem-solving skills. They also maintained that the existence of shared goals in

Logo software enhanced cooperative interaction and collaborative decision making in the participating children. Selecting software that offers opportunities to problem solve and share goals may be necessary to enhance the peer interaction of young children.

Perlmutter & Behrend (1985) were interested in the educational and social value of computer activities for young children. They investigated the social influence of computer activities on young children by observing one group of children working together on the computer compared to another group of children who worked alone on the computer. The participants in this study were 60 children attending child care centers. None of the children had computers at home. The group was evenly divided between males and females and the mean age of the children was 4-years 8-months. One half of the children made up the younger group with a mean age of 4-years and 6-months and the other half formed the older group with a mean age of 5-years and 2-months. Twenty children were randomly assigned to an alone condition and 40 children (20 pairs) were randomly assigned to the pair condition. The children were matched with the same gender classmates in the pair condition.

An Apple computer with commercially available software from the Minnesota Education Computing Consortium (MECC) was used in the study. Three software programs that focused on alphabet identification and three programs related to counting were used. The programs were a drill and practice format that required a correct response or three consecutive errors for the program to advance to the next activity. The children selected the software they used.

All of the children participated in a pre-test session, introduction session, two computer sessions, and a post-test session. During the pre-test session, four assessments

were individually administered to each child. Each child was requested to recite the alphabet and verbally count as high as they were able to count. The children were also given the Peabody Picture Vocabulary Test (Dunn & Dunn, 1981) and the Draw-A-Design subtest on the McCarthy Rating Scales for Children (McCarthy, 1972). During the introductory session, the children were individually taught to use the computer and the software programs.

After the introductory session, the children participated in two 15-minute sessions at the computer in which they worked either alone or with a peer. The sessions occurred within four days of each other. An observer intervened only when questioned or negative interactions between the children occurred. During the sessions, the children's behaviors were recorded by the software programs (e.g., number of programs accessed, number of correct and incorrect responses, and total time on task). In addition, an observer recorded the children's behaviors according to a framework developed by Bar-Tal, Raviv, and Goldberg (1982). Categories of behaviors recorded included affect, questions directed to observer, descriptions, and instructions (e.g., telling peer what to do).

During the post-test session, two weeks following the computer sessions, the children were individually tested for their memory of the computer sessions. Memory was assessed with recall and recognition tests. In the recall test, children were asked the number of games on the software, content of the games, and the starting operations of the game. In the recognition test, the children were shown a reproduction of the program menu and asked the same question as in the recall test. The affective rating was obtained by each child rating the computer activity using five faces ranging from frown to a big smile representing a scale from 1 to 5.

Perlmutter and Behrend (1985) analyzed time on task, number of programs accessed, number of correct and incorrect responses, affect, and memory using a 2(condition) X 2 (age) X 2 (gender) MANOVA. They found that the children who worked alone, as compared to the children who worked with a peer, spent about the same amount of time on task. The children who worked alone accessed more programs than individual children in the paired condition, but children in the paired condition were exposed to more software programs because two children accessed the programs.

Children who worked alone made fewer responses than the children in the paired condition and the younger children made fewer responses than the older children. In addition, boys made more responses than girls. Children who worked alone produced more correct responses than individual children in the paired condition, but the number of total correct responses in the pair condition was greater than in the alone condition. Incorrect responding was more rapid, but not more frequent in the second session for the two groups. Both recall and recognition scores were higher for the children who worked with a peer than for the children who worked alone. This difference was more evident with the older children.

The computer activity was rated high on a scale of 1 to 5, with the mean affect rating being 4.9 in the post-test session, for children in both conditions. The girls rated their affect higher than boys. In addition, children who worked with a peer rated their affect higher than the children who worked alone. Based on observational data, there were twice as many instances of positive affect shown by children in the paired than in the alone condition. Significantly more positive affect was observed in the older children than in the younger children.

Perlmutter and Behrend (1985) suggested that computer activities are appropriate, enjoyable, and productive for preschool-aged children. All of the children rated the computer activity as enjoyable. The findings of this study indicated that young children enjoy learning in pairs rather than alone and remember more about their experiences when they work together. The authors concluded that the dyad experience was more enjoyable and productive for the older preschool children. They suggested that the younger children found the combination of both the social and cognitive demands of the computer activity more taxing as compared to the older children.

Like Clements and Nastasi (1988), Haugland (1992) studied the effect of different software programs on the developmental outcomes of young children. She conducted a seven month study that investigated the effect of developmental and non-developmental software programs on the intelligence, creativity, and self-esteem of preschool children. The study compared the developmental outcomes of children who participated in different software activities compared to a control group of children who did not have access to computer activities.

The children in the study were 49 children, ranging from 4-years to 5-years old. Thirty-six of the children were enrolled in three classrooms (Classroom One, Two, and Three) at a preschool located at an university. The control group of 13 children were enrolled in one classroom (Classroom Four) at a community-based preschool center. Using a series of ANOVAs before the intervention, no significant differences were found among the four groups in parent education, parent occupation, and family size. The four classrooms were similar in physical environment, material provided, and teaching philosophy. The instruments administered to the children as the pre-test and post-test

assessment included the Detroit Test of Learning Aptitude (Hammill & Bryant, 1986) designed to measure intellectual abilities, Multi-dimensional Stimulus Fluency Measure (Moran, Milgram, Sawyers, & Fu, 1983) used to determine creativity, and Behavioral Academic Self-Esteem (Coopersmith & Gilberts, 1982) used to evaluate self-esteem and social attraction of the children.

The three classrooms at the university preschool were randomly assigned to one of three conditions: developmental software with supplemental activities, developmental software, and non-developmental software. A computer center was set up for each of the three intervention classrooms. Different software programs were available for the children to use one-hour a day, three days a week, for seven months. The children had free choice of the computer center within the one hour. Data were collected on computer use when a child worked with another child on the computer. The amount of time the children spent on the programs was recorded. The children were provided assistance to operate the programs, but were not provided instruction to expand on the activities or to influence peer interactions.

The developmental software programs selected for use received high scores on the Developmental Software Scale (Haugland & Shade, 1988). Some of these included Facemaker (Queue, 1986), KinderComp: Draw (Queue, 1986), Stickybears Numbers (Optimum Resource, n.d.), and Talking Textwriter (Scholastic Consumer, 1986). Classroom One and Two used these developmental software programs. In addition, Classroom One received supplemental activities related to the software programs on a table next to the computer. These activities reinforced the main concepts being taught by the programs (e.g., numbers, letters, art).

Classroom Three used developmental software programs that received low scores on the Development Software Scale. Some of these included Colors and Shapes (Compass Learning, 1984), Early Games (Queue, 1984), KinderComp (Queue, 1982), Patterns and Sequences (Compass Learning, 1984), Reader Rabbit (Learning Company, n.d.), and Stickybears Shapes (Optimum Resources, n.d.). No computer activities were available to the children in Classroom Four, the control classroom.

Results of this study indicated that the children in Classroom One spent an average of 14 minutes weekly on the developmental software and 24 minutes on supplemental activities. Children in Classroom Two spent an average of 15 minutes at the computer station per week. Children in Group Three spent an average of 43 minutes using nondevelopmental software at the computer per week.

Pre-and-posttest scores on the assessments were compared using *t* tests. Children in Classroom One and Two who used developmental software had comparable significant gains in general intelligence on posttest scores compared to the control group. No significant gains in intelligence were found for the children in Classroom Three who had access to non-developmental software or the control group in Classroom Four who had no access to technology. In addition, children in Classroom Three had a decrease in creativity scores compared to the control group in Classroom Four. Children in Classrooms One, Two, and Three showed significant increases in compatibility and attractiveness to peers compared to the control group. All groups of children significantly increased their initiative and social attention from the pre-test to the posttests.

Haugland (1992) identified several limitations to her study. The children were not randomly assigned in the classrooms and there were some inherent differences in the

classes (e.g., different teachers and environmental arrangement). Haugland (1992) suggested that the children in Classroom Three who used the drill and practice non-developmental software were attracted to the passivity of programs similar to watching television. Therefore, they spent more time at the computer station using the non-developmental software and scored lower in creativity on the posttest. Haugland (1992) also suggested that the effect of computer activities, like other learning resources, on the development of children depends on the use of the software programs by the classroom teacher.

Children With Disabilities

Computers and related technology may be helpful in the implementation of inclusion for young children with disabilities (NAEYC, 1996a). The primary use of technology with young children with disabilities has been to provide for their full participation in the social and educational environment of the preschool (Brett, 1994). During computer activities, children with disabilities may interact with typically-developing peers by making choices, giving instruction, and making things happen. The following is a review of research related to young children with disabilities and computer activities focused on facilitating social interaction among children.

McCormick (1987) compared the social and communication behaviors of young children with and without disabilities during computer and toy play. The participants of the study were five children enrolled in an integrated preschool program. Two of the participants had disabilities and three of the participants were children without disabilities. Participant One (Bart) was 5-years and 11-months of age and had social and language delays, slow and often unintelligible speech, and both fine and gross motor

delays. Participant Two (Kenny) was 5-years and 2-months of age and functioned near age-level cognitively and linguistically. He had severely impaired vision and a mild hearing loss. The other participants: Lewis, Jamie, and Peter were typical learners between the ages of 3-years and 11-months and 5-years and 3-months. They had age appropriate functioning in all developmental areas and were selected for participation in the study based on a subjective assessment of their social and linguistic skills. All children were in the same class except Peter who was the youngest typical peer from another class.

The videotaped observations of the computer and toy play were completed in a separate experimental room from the classroom. An Apple computer with a Muppet Learning Keys keyboard by Jim Henson and software by Sunburst Communications were used for the computer activity. A Fisher Price garage and accompanying small toys placed on the floor were used for the toy activity. The children worked in dyads and were brought into the experimental room for two, 10-minute sessions daily. The children played with the toys during one session and played with the computer during the other session. The order of the sessions was randomized each day and two hours elapsed between the sessions. The dyads participated in the play sessions for ten weeks. There were a total of 52 sessions among all of the participants. Forty of the sessions included children with and without disabilities, six sessions involved only children without disabilities, and six sessions included only children with disabilities

An interval rating system was used to record the occurrence of the social and communicative behaviors identified as peer-directed vocalizations, self-directed vocalizations, and play levels (parallel, associative, or cooperative) from the videotaped

sessions. The occurrence of each behavior was marked every ten-seconds for each minute of the session.

Descriptive statistics were used to report results. Percentage of intervals of vocalizations and play levels were reported. There was no substantial difference in peer-directed vocalization during computer and toy activities for the children with disabilities. Bart vocalized in 41.5% of the intervals during toy play and 42% of the intervals during computer play, and Kenny vocalized in 41% of the intervals during toy play and 49% of the intervals during computer play. The oldest typically developing peer (Lewis) had the most vocalizations (63% of the intervals) across both activities. Data from the single sessions, when each typically developing peer was paired with a child with disabilities, revealed that all three typically developing children vocalized more when interacting with another typically developing peer as compared to either Bart or Kenny (the children with disabilities). The typically developing peers, when paired with the children with disabilities, were more vocal in the computer activity than in the toy activity.

Percentages of intervals in which different play levels were recorded during toy and computer activities also were reported. The children with disabilities (Bart and Kenny) participated primarily in parallel play which is the least interactive of the three play categories. They participated in more sophisticated play (associative and cooperative) during the computer activity than in the toy activity. Bart participated in parallel play with toys in 73.5% of the intervals as compared to in 45% of the intervals during computer play. He participated in associative or cooperative play with different play partners in 8 to 46% of the intervals during toy play and 22 to 86% of intervals during computer play. Bart had the most advanced play interactions with Lewis who was

the typical peer closest in chronological age to him. Kenny, who had a disability, also had less parallel play during computer activity (41% of the intervals) compared to toy activity (68% of the intervals). He participated in associative play with different play partners in 26 to 33% of the intervals during the toy sessions and 52 to 90% of the intervals during the computer sessions. He did not participate in cooperative play during any of the sessions. Kenny had the most advanced play interactions with Peter who was the youngest typically developing peer.

The play of the dyads of children without disabilities was more sophisticated than the dyads of children with disabilities or the dyads of children with and without disabilities. The dyads of typically developing children had far more associative and cooperative play compared to parallel play than the dyads comprised of children with disabilities. The typically developing children participated in cooperative play during 55% of the intervals during toy play and 41% of the intervals during computer play.

McCormick (1987) suggested that computer activities involving dyads of children may provide a motivating learning environment in which to practice and expand communication and social skills for children with disabilities. The two children with disabilities (Bart and Kenny) did not differ substantially in their peer directed vocalizations while they participated in the toy and computer activities. However, children with disabilities had higher levels of social play during the computer activity compared to the play activity.

In an alternating treatment design, Spiegel-McGill, Zippiroli, and Mistrett (1989) compared the social behaviors of children with and without disabilities as they played with computer activities, a remote controlled robot, and a no toy condition. The goal was

to identify preschool play materials that could be conducive to facilitating peer interactions. The researchers hypothesized that computer activities would act as an equalizer for children who have physical disabilities or speech disabilities.

Eight children enrolled in a model integrated preschool program participated in the study. All participants were in the same preschool class and knew each other. Four out of the nine children with disabilities in the class were chosen to participate in the study. Participant One (Karen) and Two (Jake) had multiple disabilities and were five-years old. Karen and Jake were reported by the teachers to be the least socially competent of the preschoolers with disabilities. Participants Three (Evan) and Four (Michael) had orthopedic disabilities. Evan and Michael were ranked by the teachers as having the highest social competence of the students with disabilities. The four children without disabilities were rated by the teaching staff as highly social and interactive. The peers without disabilities ranged in age from 4-years and 10-months to 5-years and 4-months. The children with and without disabilities were paired into dyads of the same gender. Each dyad consisted of a child with a disability paired with a child without a disability. The teaching staff selected the dyads based on their observations of existing peer preferences. All children received training in the use of the computer and the robot before the intervention sessions.

The intervention sessions were conducted in a small room adjacent to the integrated classroom. The dyads and a teacher were the only individuals present in the experimental room. The teacher only initially engaged the children in the activity for each condition and then verbally instructed them, "It's time to play." She then positioned herself away from the children. In the computer intervention condition, the two children

were seated next to each other in front of the computer. In the robot intervention condition, the two children were seated on the floor next to each other facing the toy robot. In the third condition, both the computer and robot were present but unplugged. The children were able to sit at the computer or on the floor.

An Apple computer with a standard keyboard and a touch sensitive pad were used as input devices for the computer activity. Software programs were selected based on each child's ability and they were rotated daily. Karen and Jake who had multiple disabilities were given software that required no correct answer and changed screens when any key was touched. Some of these included Stickybears ABC (Optimum, n.d.), Stickybears Numbers (Optimum, n.d.), and the Muppets on Stage (Sunburst Communications, 1987). Evan and Michael also used open-ended and drill and practice software, but their software required more sophisticated response repertoires. The software programs included Facemaker (Queue, 1986), Memory Building Blocks (Sunburst Communication, 1986), Muppets on Stage (Sunburst, Communications, 1987) and Stickybears Opposite (Optimum, n.d.). These programs require children to perform two or more steps in succession to activate the program and to make decisions in the program.

The robot intervention consisted of a remote-controlled robot from Radio Shack. Pressing a button on a remote control device activated the robot. The device was mounted on a power pad to simulate the size of the touch sensitive pad. A tray of small objects was also provided for the children to manipulate using the robot. In the third condition, the children were placed in the room together, but the computer and robot were turned off. The children were allowed to sit and do whatever they wanted to do.

The dyads participated in each of the three intervention conditions for 5 minutes in an alternating fashion. Data were collected on the percentage of intervals each child engaged in social directed behavior with his or her partner. Only positive interactions were scored and there was no distinction between initiations and responses. The occurrence of socially directed behavior was scored if one or more of the following behaviors were exhibited: (a) one of the children emitted a discrete vocalization; (b) one of the children addressed the other child by name; (c) the children were in physical contact with each other; and (d) the children cooperatively used the same piece of equipment or toy. Observers used a time sampling system in which they watched every three seconds and recorded every seven seconds for thirty, 10-second intervals. Percentage of intervals that contained socially directed behaviors was compiled.

Visual inspection of the percentage of intervals with socially directed behaviors revealed that Karen and Jake consistently engaged in more socially directed behaviors with their peers while playing with the computer. Karen interacted socially with her peer in 44% of the intervals during computer play, 26% of the intervals during the robot play, and 28% of the intervals during play without materials. Jake exhibited social interaction in 42% of the intervals during computer, 14% of the intervals during robot play, and 16% of the intervals during play without materials.

Michael and Evan showed similar performance across the three intervention conditions. Michael showed more social interaction during the computer activity. He interacted socially with his peer in 32% of the intervals during computer play, 27% of the intervals during the robot play, and 24% of the intervals during play without materials.

Evan exhibited social interaction in 33% of the intervals during computer, 29% of the intervals during robot play, and 40% of the intervals during play without materials.

Spiegel-McGill et al. (1989) suggested that computer activities may be a more powerful social facilitator for children with more significant disabilities. They also hypothesized that the high reactivity (visual and auditory feedback) of the technology may compensate for skill deficiencies of the children with disabilities when they play with children without disabilities. Spiegel-McGill et al. (1989) concluded that more research is needed concerning the long term social implications of computer use within a classroom setting for children with disabilities and their typically developing peers. The small number of children who participated in this study indicates a need to replicate the research across more children from a variety of disability categories.

The social, play, and communication behaviors of young children with disabilities during teacher supervised computer activities and other play activities was investigated by Howard, Greyrose, Kehr, Espinosa, and Beckwith (1996). The setting of the study was the UCLA Intervention Program and three public preschool programs. All three schools are part of the Los Angeles Unified School District's special education program.

All children in the study qualified for early childhood special education. The experimental group consisted of 22 children in preschool classrooms that routinely implemented computer activities. Fourteen of the children were between the ages of 3-to-5-years and eight children were between the ages of 18-to-36-months. A comparison group of 15 children participated in the study. These children were enrolled in a program that did not provide computer activities. The comparison group children were between the ages of three-to-five years.

The eight younger children in the experimental group attended a center-based early intervention program three, half days per week. The 14 older children in the experimental group attended eight different self-contained special education programs located at three different school sites. They attended school five full days a week.

In the early intervention program and the eight different classrooms there were computer stations set up for the children. Hardware consisted of an Apple computer, alternative input devices, and seven software programs developed by the UCLA Microcomputer Project (Old MacDonald's Farm, Zoo Time, Paper Dolls I, Paper Dolls II, Community Vehicles, Dinosaur Game, and the Occupations). The software programs were developed specifically for young children 18-to-36 months and 3-to-5-year olds. The older children used all seven programs and the younger children used all the programs except for the Dinosaur Game or Occupations software programs.

The teachers in the early intervention program and the three school sites received in-service training sessions. The training included a review of the computer hardware, adaptive devices, educational content of the seven software programs, and the plan to incorporate the software programs into the curriculum. Technology consultants were available for individual consultation throughout the duration of the study.

During the computer activity, the children were placed in groups of two or three in front of the computer. The teachers sat at the side of the children and described the software content, assisted in the pacing of activities, helped with positioning of adaptive devices, and provided physical support to access the computer. The younger group participated in the computer activities three days a week with an average session lasting about 15 minutes. The older group of children participated in the computer activities five

days a week for 20-minute sessions. The comparison children engaged in typical preschool activities and did not engage in any computer activities.

The experimental children and comparison children also participated in non-computer play activities. These non-computer activities were conducted three times a week for the younger group and five times a week for the older children. Toys that corresponded to the topics of the software programs were used by the children either at a table or on the floor. The small groups were comprised of two to five children who played under the supervision of the teacher. Each child participated in these play activities for an average of twice a week during the three months of data collection.

Data collected included observations of the childrens' level of play and social interaction using the Peer Play Scale (Howes, 1980). This instrument measures the following behaviors: social initiations, social play behaviors, social pretend play, vocalizations, and affect. A research assistant conducted the observations and coded the behaviors of the children. The behaviors were recorded using a time sampling procedures of every 15-seconds per ten minute observation. Ten observations were obtained for each child in the computer group (five on the computer and five off the computer playing with toys). Five observations were conducted on each child in the comparison group while they played with the toys available during the non-computer play activities. Therefore, each child in the computer group was observed for 100 minutes and each child in the comparison group was observed for 50 minutes.

Data analysis was conducted using *t* tests to compare the behaviors during computer and non-computer play activities of the toddlers, preschool children, and the comparison group. Results indicated that the toddlers had higher levels of social play in

the computer intervention than during the toy activity. They demonstrated an equal amount of communication in the computer and play activities, but showed higher affect during computer activities. The preschool-aged children also exhibited a higher level of social play during the computer intervention, but showed more social pretend play when engaged in the toy activities. As with the toddler group, the preschool-aged children had an equal amount of verbal and non-verbal communication during the two play conditions. However, they showed more positive affect when using the computer. The comparison group of children, who did not receive any computer intervention, had lower levels of social play and less positive affect compared to the preschool-aged children who received the computer intervention.

Howard et al. (1996) concluded that when the young children played on the computer they were actively engaged in the activity, responsive to turn taking, and involved in social exchanges. This was especially important for the children with disabilities because they were considered at risk for learned helplessness in situations in which they were unable to physically manipulate the toys in their environment. The researchers also noted that the children seemed more vulnerable to social withdrawal and the teachers were less engaged with them during the toy play activities. This may due to the fact that the computer center provided a small structured space where teachers and children interacted in close proximity. In addition, the computer acted as an adaptive device that enabled activity engagement that otherwise could not have been accomplished by the children with disabilities.

Summary

The social development of typically developing children has been studied since the early 1930s, but only in the last twenty years has the social skills of children with disabilities received attention (Buysee, 1993; Cavallaro & Porter, 1980; Odom et al., 1992). The literature in early childhood education indicates that the play and social skills of typically developing children develop in a sequential pattern with more parallel and cooperative play with peers replacing solitary play (Howes & Matheson, 1992). Early childhood special education studies have indicated that children with disabilities encounter difficulties with social skills and social interaction with peers (Cavallaro & Porter, 1980; Guralnick & Groom, 1988). More recently, the focus of social skills research has switched to inclusive education and the examination of the social competence of children with disabilities in inclusive classrooms.

Children with disabilities frequently have problems with initiating, maintaining, and responding within the context of peer interactions (Evans et al., 1992; Hanline, 1993) When placed in self-contained educational classrooms, they often lack the opportunities to practice age-appropriate skills with typically developing children. Research has shown that children with disabilities perform better socially in integrated environments with same-aged peers without disabilities (Guralnick et al., 1995; Guralnick & Groom, 1988) However, even in integrated play groups and classrooms, children with disabilities continue to interact less frequently and successfully than their peers without disabilities. It appears that regardless of environment, typically developing peers prefer to play with other typically developing peers rather than with children with disabilities (Cavallaro & Porter, 1980; Hall, 1994; Schnorr, 1990).

One of the major priorities in early childhood education and special education is to optimize the social competence of all children including children with disabilities in an inclusive educational setting. The interventions that have been used include environmental arrangement of the educational setting, teacher facilitation of social skills and interactions, and peer mediated instruction (DeKlyen & Odom, 1989; LeBlanc & Matson, 1995; Odom, et al., 1986). All of these methods show the potential to assist children in gaining social skills. Comparative efficacy studies only recently have begun to focus on effective teaching methods that can be used for young children with and without disabilities in inclusive classrooms (Odom et al., 1999).

Beginning in the 1980s researchers began to explore the social implications of computer use for children with and without disabilities. Despite initial fears that computer activities would socially isolate children, researchers have shown that typically developing children learn basic concepts on the computer and enjoy interacting with their peers during computer play (Clements & Nastasi, 1988; Haugland, 1992; Perlmutter & Behrend, 1985). The amount of learning and social interaction appears to be dependent on the developmental appropriateness of the software programs used by the children. Software programs that are open-ended and allow for joint decision making appear to be more conducive to social interaction among young children (Clements & Nastasi, 1988; Haugland, 1992). The use of assistive technology and specifically computer activities is now an accepted practice by early childhood teachers and researchers as a means by which children can explore their environments, learn, and socially interact (NAEYC, 1996a).

While preliminary studies indicate that children with disabilities are motivated to use the computer and socially interact with their peers during computer activities more than during play with toys, there is little information concerning the teacher's role in the facilitation of social interactions during the computer activity. As computers become more and more an integral part of the early childhood classroom, there is a need for further information concerning the use of computer activities alone or coupled with teacher facilitation to optimize the social competence of children. As education moves into a more integrated world for young children with disabilities, the focus of early childhood education and research must turn to interventions that provide an opportunity for these young children to be more successful in their social interactions with their peers in this inclusive world.

CHAPTER 3

METHOD

Overview

The efficacy of assistive technology, specifically computer activities, has been an issue of debate in the field of early childhood (Bredekamp & Rosegrant, 1994; Pierce, 1994). Because of this debate computer activities continue to be viewed as supplemental rather than essential in the daily teaching in the preschool classroom (Huntinger, Robinson, & Johanson, 1990). In addition, early childhood teachers express concerns that computer activities may be detrimental to the social and emotional development of young children (Clements & Nastasi, 1993).

This study investigated the impact of assistive technology, specifically computer activities coupled with teacher facilitation, on the social skills and concurrent interactions among young children. The findings contribute to the knowledge-base of effective strategies concerning: (a) social interaction of preschoolers in inclusive classrooms, (b) use of computer activities, and (c) use of teacher facilitation. Data were collected over a ten-week period and the social skills and social interactions of two groups of children were observed.

This study compared the social interaction of nine dyads of children with and without disabilities who received computer intervention coupled with adult facilitation to nine dyads of children with and without disabilities who received the same computer

intervention with no adult facilitation. The computer intervention involved the children participating in developmental, open-ended computer activities during regularly scheduled center time in their classrooms. Both groups of children used the software program Elmo's Art Workshop (Learning Company, 1998) (see Appendix A). This program is an open-ended art program that allows children to decorate pages with stickers and paint, fill in 18 coloring book scenes, and dress characters in costumes. The program was developed for children 3-to-6 years old.

Teacher facilitation consisted of the special education teacher prompting social interaction using prompting procedures with the children from *Play Time/Social Time* (see Appendix B) (Odom & McConnell, 1997). This type of teacher facilitation can be used in different preschool activities, including computer activities.

All sessions with the students and facilitators were videotaped. Pre-and post-measurements of social skills and systematic observations of social interaction were quantified and analyzed.

Research Questions

This study focused on six questions:

1. Do the preschool teachers perceive children with and without disabilities in the teacher facilitated computer group as improving their social skills more than the children with and without disabilities in the computer only group? It was predicted that the preschool teachers would perceive that the children with and without disabilities in the teacher facilitated computer group improved their social

skills more than the children with and without disabilities in the computer only group.

2. Do the children with and without disabilities in the teacher facilitated computer group have more positive and less negative interactions as measured by the Observer Manual than the children with and without disabilities in the computer only group? It was predicted that the children with and without disabilities in the teacher facilitated computer group would have more positive and less negative interactions while the children with and without disabilities in the computer only group would have less positive and more negative interactions.
3. Do the children with and without disabilities in the teacher facilitated computer group have more effective and less ineffective social behaviors as measured by the Social Interaction Observation System than the children with and without disabilities in the computer only group? It was predicted that children with disabilities and without disabilities would have more effective and less ineffective social behaviors in the teacher facilitated computer group while children with and without disabilities in the computer only group would have less effective and more ineffective social behaviors as measured by the SIOS.
4. Do older and younger preschool-aged children in the teacher facilitated computer group have more positive and less negative interactions as measured by the Observer Manual than the older and younger children in the computer only group? It was predicted that the older and younger preschool-aged children would have more positive and less negative interactions in the teacher facilitated computer group while the older and younger preschool-aged children in the

computer only group would have less positive and more negative interactions. In addition, it was predicted that the older children would have more positive and less negative interactions than the younger children.

5. Do the older and younger preschool-aged children in the teacher facilitated computer group have more effective social behaviors and less ineffective social behaviors as measured by the Social Interaction Observation System than the older and younger children the computer only group? It was predicted that the older and younger children in the teacher facilitated computer group would have more effective social behaviors and less ineffective social behaviors while the older and younger children in the computer only group would have less effective social behaviors and more ineffective social behaviors. In addition, it was predicted that the older children would have more effective and less ineffective social behaviors than the younger children.
6. What are the perceptions of special education teachers regarding the use of computer activities and teacher facilitation to improve to social skills of young children with and without disabilities?

Students

The students in this study were selected from children attending a community-based inclusive preschool program on the University of Nevada, Las Vegas (UNLV) campus. The children in the preschool program range in age from 3-to-6 years old and were selected from four different preschool classrooms. Only children whose parents signed a human subject consent agreement (see Appendix C) participated in this study.

Students with Disabilities

Nineteen children with disabilities attend the preschool program. Eighteen children with disabilities returned their parental consent form to participate in the study. One child with a disability who had poor attendance did not return the consent form and did not participate in the study.

All eighteen of the children with disabilities who received parental consent participated in this study (see Table 1). Criteria for participation in the study for the children with disabilities were: (a) qualified for early childhood special education and/or related services in Nevada, and (b) had an Individualized Education Program (IEP). A child qualifies for early childhood special education in the State of Nevada if he or she has been evaluated as having one of fourteen disabilities (autism, deaf-blindness, deafness, developmental delay, hearing impairment, mental retardation, multiple disabilities, orthopedic disabilities, other health impairment, serious emotional disturbance, special learning disability, speech or language impairment, traumatic brain injury, or visual impairment) and because of the disability needs special education and/or related services.

Students without Disabilities

Children without disabilities in this study were children who did not qualify for special education and /or related services and who did not have an IEP. Approximately 25 children without disabilities were in each of the four classrooms for the morning and afternoon sessions. This resulted in approximately 100 children without disabilities who were potential participants in the dyads. Only children who attended the same class at the same time as the children with disabilities were considered as potential participants. The

names of these children without disabilities were placed into a container and eighteen names were selected randomly to participate in the dyads (see Table 1). Any child with limited English proficiency or who was currently being processed through Child Find was not included in the study. One child without disabilities refused to participate in the dyad and was replaced after the first day of data collection by random selection from the remaining children without disabilities.

Table 1

Demographics of Students With and Without Disabilities

Characteristics	Hearts	Ladybugs	Butterflies	Rainbow
Gender				
Male	4	8	8	4
Female	4	4	0	4
Total	8	12	8	8
Age				
Mean	3.1	3.8	4.3	5.1
Range	2.11-3.4	3.4-4.0	4.0-4.11	4.11-5.10
Ethnicity				
Caucasian	6	10	4	6
African American	1	1	1	1
Asian American	0	0	3	0
Hispanic	0	1	0	0
Biracial	1	0	0	1
Disability				
Autism	1	1	1	1
Cerebral Palsy	0	1	0	0
Developmental Delay	3	4	2	2
Down Syndrome	0	0	0	1
Fragile X Syndrome	0	0	1	0
Total	4	6	4	4

Dyads of children with and without disabilities

Eighteen dyads were established by pairing the children with disabilities with the children without disabilities. Eighteen of the children with disabilities between 3-to-6 years old were paired with same age and same gender peers without disabilities. The names of the children with and without disabilities were placed into two separate containers. A pair of names, one from each container, was drawn randomly to form the dyad. This process was repeated for each class until eighteen dyads were established (See Table 2).

Table 2

Dyads of Children With and Without Disabilities

Dyad	Class	Gender	Ages	Child without Disabilities	Child with Disabilities	Disability
1	H	Girl	3.0/3.1	Gwen	Isabella	DD
2	H	Girl	3.1/2.10	Mary	Intesar	DD
3	H	Boy	3.1/3.0	Eddie	Adam	Autism
4	H	Boy	3.4/3.4	Troy	Mo	DD
5	L	Girl	3.8/3.8	Makenzie	Hannah	DD
6	L	Girl	4.0/3.6	Madeson	Regina	DD
7	L	Boy	3.9/3.5	Tyler K.	Sam	DD
8	L	Boy	3.8/3.7	Jayson	Jacob	DD
9	L	Boy	3.8/3.4	Nathan	Kelly	Autism
10	L	Boy	3.11/3.6	Drew	Tyler G.	Cerebral Palsy
11	B	Boy	4.4/4.3	Tynoa	Vincent	Fragile X
12	B	Boy	4.0/4.0	Charles	Houston	DD
13	B	Boy	4.5/4.11	Mac	Connor	DD
14	B	Boy	4.0/4.10	Noah	Dylan	Autism
15	R	Girl	5.4/5.3	Devin	Darien	Down syndrome
16	R	Girl	5.0/4.11	Mallory	Lauren	DD

Table continues

17	R	Boy	4.11/5.3	Donovan	Eric	Autism
18	R	Boy	4.11/5.2	Justin	James	DD

Note. DD indicates developmental delay. H, L, B and R indicate Hearts, Ladybugs, Butterflies, and Rainbow classrooms respectively. Under the age column, the age in years and months of the child without disabilities is listed first followed by the age of the child with disabilities.

Teacher Facilitators

The two experienced special education teachers who were regularly assigned to the preschool were the teacher facilitators in this study (see Table 3). Teacher A had 14-years of teaching experience, with 3-years of experience in an inclusive setting. Teacher B had 5-years of teaching experience, with 3 years of experience in an inclusive setting. Both of the teachers have Master's Degrees in Special Education. Each teacher signed a consent form to participate in the study (see Appendix D).

Table 3

Demographics of the Special Education Teachers

Characteristics	Teacher A	Teacher B
Gender	Female	Female
Degree	Master's Degree in Special Education	Master's Degree in Special Education
Years Teaching	14	5
Years Teaching in Inclusive Preschool Setting	3	3
Age	54	39
Ethnicity	Caucasian	Caucasian

Preschool Teachers

There were four preschool teachers who provided information on the social skills of the children in the study. They were all current students at the university (see Table 4).

Table 4

Demographics of the Preschool Teachers

Characteristic	Hearts	Ladybugs	Butterflies	Rainbow
Gender	Female	Female	Female	Female
Age	24	23	43	48
Ethnicity	Caucasian	Caucasian	Caucasian	Caucasian
Enrolled in Degree Program	Bachelor's Degree in English	Bachelor's in Early Childhood Education	Bachelor's in Early Childhood Education	Master's Degree in Early Childhood Special Education
Years Teaching	1	2	18	25
Years Teaching in Inclusive Preschool Setting	1	2	2	4

Interrater Observers

Two individuals were recruited to assist in the checking of data for reliability. They were doctoral students in special education who have experience in early childhood education. One individual assisted in viewing and rating 25% of the videos and coding

the children's behaviors using the SIOS (Kreimeyer et al., 1991) and the other individual viewed and rated 25% of the videos using the Observer Manual (Antia et al., 1990).

Setting

Preschool

This study was conducted in the University of Nevada, Las Vegas/Consolidated Students University of Nevada (UNLV/CSUN) Preschool located on the UNLV campus. The preschool provides services to a diverse student and family population comprised of UNLV employees, students, and community families. It is located in a neighborhood in which many families live in poverty and are bilingual. The preschool is accredited by the National Association of Education for Young Children (NAEYC) and adheres to the philosophy of inclusion.

The preschool also has an interagency agreement with the Clark County School District (CCSD). Under the terms of this agreement, the preschool accepts local children with disabilities, tuition free, in exchange for staff support and supplies. Approximately 10 % to 15% of the preschool students have disabilities each semester. The preschool students and staff represent the different ethnic groups of the Las Vegas community (e.g., European American, African American, Asian American, Hispanic American, Native American, and students from the Middle East).

Classrooms

Data collection occurred in the four preschool classrooms for children from 3-to-6 years of age (Hearts, Ladybugs, Butterflies, and Rainbows). The Hearts classroom is for 3-year-old children and the Ladybugs classroom is for 3.5-year-old children. The

Butterflies classroom is for 4-year-old children and the Rainbows classroom is for children aged 4.5-years and older. Each classroom is staffed with a preschool teacher, itinerant special education teacher, and three teaching assistants. The adult-to-child ratio is approximately five children to one adult. Each classroom has a computer center for use during the daily scheduled center time. This study was conducted at the computer center located in the four classrooms.

Instrumentation

Teacher Impression Scales

Permission was granted to use the Teacher Impression Scales (TIS) (McConnell & Odom, 1993) for this project (see Appendix E). The TIS (see Appendix F) is an assessment designed to evaluate social skills associated with peer interaction. It is a Likert-scale questionnaire focusing on the social skills exhibited by a child necessary for interacting with peers in a school setting (e.g., converses appropriately, takes turns, plays cooperatively, persists at social attempts, responds to peers, smiles appropriately, appears to have fun). The assessment is comprised of 16 items on which the teacher rates a child from never performing a skill (ranking of 1) to frequently performing a skill (a ranking of 5). The preschool teachers of the Hearts, Ladybugs, Butterflies, and Rainbow classrooms completed the TIS for each of the students as a pre-and-post social skill assessment. The TIS was scored by adding the scores on each of the 16 items. Observers A and B independently scored the TIS surveys for interrater agreement. The interrater agreement was 100 %.

Social Interaction Observation System

Permission was granted to use the Social Interaction Observation System (SIOS) (Kreimeyer et al., 1991) in this study (see Appendix G). The SIOS (see Appendix H) is designed to discriminate 15 social interaction behaviors that may occur during social interactions (e.g., positive peer interactions, negative behaviors directed to peer, nonplay behavior, solitary play, parallel play, cooperative play, positive linguistic interaction, peer initiations of interaction, child responds positively to peer initiation, child responds negatively to peer initiation, no response to peer initiation, child initiation of interaction, peer responds positively to child's initiation, peer responds negatively to child's initiation, or peer makes no response to child's initiation). These behaviors are divided into eight socially-effective behaviors and seven ineffective behaviors.

Observer Manual

Permission was granted to use the Observer Manual (Antia et al., 1990) in this study (see Appendix I). The Observer Manual (see Appendix J) identifies positive and negative interactions of children. Positive interactions include conversation, giving requests, polite refusals, sharing materials, playing cooperatively, interacting in games, and displaying physical signs of affection. Negative interactions include snatching materials, shouting, hitting, throwing, pulling, and pushing objects.

Teacher Interview

Prior to and immediately following the intervention phase of this study, interviews were conducted with the two special education teachers who conducted the teacher facilitation. The teachers were asked three questions: (1) What are the advantages of using teacher facilitation with a computer activity to teach social skills to

children with and without disabilities? (2) What are the disadvantages of using teacher facilitation with a computer activity to teach social skills to children with and without disabilities? and, (3) For what purpose(s) would you use teacher facilitation and the computer as opposed to other activities to promote social interaction?

Materials

Software

Software programs that lend themselves to turn taking and sharing are appropriate to structure computer use as a social activity (Davidson & Wright, 1994). These programs include a construction component that allows children to work together to create a product (e.g., painting, picture, or puzzle). Only open-ended, developmentally appropriate software programs that were not used in the preschool were considered for this study.

The software program selected was a creative, open-ended software program critiqued on the Children's Software Review (CSR) website (http://www.childrenssoftware.com.) This website reviews all interactive media for children. This includes CD-ROMs, videogames, and Internet sites for children. A team of four educators and 135 families evaluate software based on the Children's Software Evaluation Instrument (Children's Software Review, 2000). This instrument considers six factors: ease of use, extent to which the software is childproof, ability to educate, ability to entertain, design features, and value. The cumulative scores on a piece of software result in a rating of one-to-five stars. Since 1984, over four thousand titles have

been reviewed and posted on this website. Thirteen consumer and education print magazines reprint CSR reviews and articles (Children's Software Review, 2000).

Children's Software Review editors recommend programs that receive a 4.3 star rating or better for use with children. Only programs that received a 4.3 star (good) to 5.0 star (excellent) rating from CSR were considered for use in this study. The software programs considered were developed specifically for preschool-age children. Additional considerations for the software included construction and creative components that allowed the products created by the children to be printed.

Elmo's Art Workshop (Learning Company, 1998) was selected as the software for this study because it received 4.3 rating from CSR. This software was not currently being used in the preschool and it was developed for children ages 3-to-6 years old. Elmo's Art Workshop is an open-ended art program that allows children to decorate pages with stickers and paint, fill in coloring book scenes, and dress characters in costumes. The children are required to use their creativity to choose tools, colors, characters, and objects to construct pictures. The design of the software provides opportunities for two children to share ideas and create products by verbally consulting each other about their decisions regarding their joint creation. It also allows for turn taking to make their product.

Computers

There were computer centers in each of the four classrooms involved in the study. Each center consisted of at least one computer and one printer. The Hearts and Ladybugs classrooms each had one Macintosh computer. The Butterflies classroom had a Macintosh and a Dell PC computer. The Rainbow classroom had two Macintosh

computers. During the study, only one computer was turned on in each classroom. The computers were placed on top of a child size table so that the children could view the screen and operate the mouse independently. The children sat next to each other in two chairs facing the computer.

Training

Adults and children participated in training sessions corresponding to their participation in this study prior to data collection. This was done so that all participants were familiar with the procedures of the study, instruments used in the study, and the software. The two special education teachers were trained to use the teacher facilitation procedure (Odom & McConnell, 1997) to facilitate social interaction at the computer center and in the operation of the computer software program. The interrater observers were trained to use the Social Interaction Observation System (Kreimeyer et al., 1991) and the Observer Manual (Antia et al., 1990) to record the social behaviors and interactions of the children. Finally, the children with and without disabilities received training on basic mouse skills and on the use of Elmo's Art Workshop.

Special Education Teachers

The two itinerant special education teachers were trained to use teacher facilitation of social interaction between the children in the dyads. The teacher facilitation was based on the prompting procedure from *Play Time/Social Time* (Odom & McConnell, 1997). The training consisted of six, one-hour sessions over a two-week time period.

Session one. The concept of teacher facilitation of social interaction was introduced to the two special education teachers. The special education teachers were asked to read two chapters on facilitating the social interaction of children in *Play Time/ Social Time* (Odom & McConnell, 1997) and a chapter on computers for a preschool curriculum from *Creative Curriculum* (Dodge & Colker, 1996).

Session two. The software program used in this study was demonstrated to the special education teachers. The four activities: color, sticker, paint, and dress up were shown to the teachers. The icons for erase, undo, print, and exit also were demonstrated. The teachers played with each of the activities and were given a copy of the software program for their own use. The use of the computer activity to facilitate interactions between students with and without disabilities (e.g., sitting in close proximity, making joint choices regarding the software activities, praising each other for play on the computer, taking turns with the mouse, and cooperating to create products with the software program) was discussed with the teachers.

Session three. The special education teachers were trained on the use of the prompting procedure described in *Play Time/Social Time* (Odom & McConnell, 1997). Examples of cues that could be used during computer activities were discussed and demonstrated in this session (see Appendix B).

Session four. Teacher facilitation to promote social interaction between students at the computer was demonstrated to the teacher facilitators. This demonstration was conducted in the Ladybug and Rainbow classrooms with four pairs of randomly selected children with and without disabilities. Teachers were shown each step of the prompting procedure including observing for noninteraction, offering specific cues for initiation or

response, offering physical guidance after noncompliance with a second verbal cue, and using the computer activity to focus the attention of the children. The facilitation demonstration was discussed with the teachers and they problem solved solutions to specific situations that arose in the demonstration.

Session five. The special education teachers practiced the teacher facilitation procedure by prompting children to successfully initiate and respond to each other. Each of the teachers instructed four pairs of students with and without disabilities who were randomly selected to participate from the four classrooms. A checklist (see Appendix K), developed for this training procedure, was used to ascertain whether the special education teachers reliably demonstrated the correct teacher facilitation procedure to prompt the children to interact with one another during the computer activity. After each pair of children worked at the computer, corrective feedback was provided to the teacher (e.g., allow more response time, give a more specific verbal prompt, only cue to one side of the interaction). The overall accuracy of each teacher was computed by taking the sum of correct steps divided by the sum of all the steps and multiplying the number by 100. Teacher A achieved a 92.5% overall mean accuracy and Teacher B achieved a 95% overall mean accuracy for the procedure (see Table 5).

Table 5

Score on Teacher Facilitation Procedure

	Trial #1	Trial #2	Trial #3	Trial #4	Mean
Teacher A	80	90	100	100	92.5%
Teacher B	90	90	100	100	95%

Session six. The last training session involved a discussion of issues regarding the facilitation training and concerns the special education teachers had regarding the teacher facilitation. The steps of the facilitation procedure were reviewed one more time and the scheduling of the intervention was outlined for the teachers.

Interrater Observer

The three observers (A, B, and C) in this study were doctoral students in special education. Observer A was the main observer and trainer. Observer B was instructed in the use of the SIOS (Kreimeyer et al., 1991) in sessions one to three. Observer C was instructed in the use of the Observer Manual (Antia et al., 1990) in sessions four to six. Each session lasted approximately 60 minutes and was conducted over two weeks.

Session one. Observer B read silently the instructions for the implementation of the SIOS (Kreimeyer et al., 1991) and the instructions were discussed. Each of the 15-observable social behaviors were defined and the use of the SIOS was demonstrated using a practice videotape of a pair of children playing together on the computer.

Session two. Using a practice videotape containing four segments of children with and without disabilities playing together at the computer, Observer B practiced using the SIOS. After each videotape segment, questions were answered regarding the SIOS procedures.

Session three. Observer B and the trainer independently used the SIOS to rate the social interaction behaviors of children on a second practice videotape. This videotape was of four different pairs of children with and without disabilities playing together on the computer. After viewing the tapes, the observer and trainer compared their observations. Any disagreements regarding the rating of behaviors were discussed and

resolved through consensus between the observer and trainer. Observer B then practiced rating the childrens' behaviors until 100% agreement with the trainer was achieved using the practice videotape. One hundred percent agreement was reached after viewing the practice video for the second time.

Session four. Observer C read silently the instructions for the implementation of the Observer Manual (Antia et al., 1990) and the instructions were discussed. The definitions of positive and negative social interactions were discussed at this session. The use of the Observer Manual was demonstrated using a practice videotape of a pair of children playing together on the computer.

Session five. Using a practice videotape containing four segments of children with and without disabilities playing together at the computer, Observer C practiced using the Observer Manual. After each videotape segment, questions were answered regarding the Observer Manual procedures.

Session six. Observer C and the trainer independently used the Observer Manual to rate the childrens' behaviors on a second practice videotape. This videotape was of four different pairs of children with and without disabilities playing together on the computer. After viewing the tapes, the observer and researcher compared their observations. Any disagreements regarding the rating of behaviors were discussed and resolved through consensus between the trainer and observer. Observer C then practiced rating the childrens' behaviors until 100% agreement with the trainer was reached on the practice videotape. One hundred percent agreement was reached after viewing the practice video for a second time.

Students with and without Disabilities

The students, with and without disabilities, in this study were taught the basic functions (e.g., placing stickers, dressing characters, painting, and drawing) of Elmo's Art Workshop (Learning Company, 1998) by Observer A. The students were paired randomly and seated in front of the computer during center time. Each of the three training sessions lasted eight minutes and were conducted on three different days. The students were trained on the program for a total of 24 minutes prior to the intervention phase of the study.

The students were shown the different software activities and functions. They then had the opportunity to make choices and maneuver through the different screens using the mouse. Verbal instructions and physical prompts were provided as needed to the students.

Design and Procedures

Phase One

The two special education teachers who were the teacher facilitators participated in the pre-study interviews in this phase. The teacher facilitators were interviewed separately regarding their perceptions of computer activities coupled with teacher facilitation to teach social skills. The interviews were videotaped and transcribed by a professional transcription service. Responses were coded using domain and componential analyses.

Parental consent was requested for all of the children in the four preschool classrooms Hearts, Ladybugs, Butterflies, and Rainbow. After one week, 95% of the

families returned the consent forms granting permission for their children to participate in the study and 5% of the families did not return their consent forms. Only children with a signed parental consent form were eligible for participation in this study. Teacher facilitators and preschool teachers also signed consent forms.

In this phase, the special education teachers were trained in the use of teacher facilitation over six, one-hour sessions and the interrater observers were trained in the use of the SIOS and Observer Manual over six, one-hour sessions. Participating students were taught to use the software Elmo's Art Workshop (Learning Company, 1998) in this phase.

Phase Two

Eighteen children with disabilities from the four classrooms (Hearts, Ladybugs, Butterflies, and Rainbow) whose parents signed the parental consent form participated in this study. They were randomly assigned to the teacher facilitated computer activity or the computer only activity.

The children with disabilities were paired into dyads with randomly selected, same gender, children without disabilities from their classrooms. The names of the boys and girls without disabilities were placed into separate containers by class. Their names were randomly drawn and matched with students with disabilities of the same gender, class, and schedule.

The TIS (Odom & McConnell, 1997) assessment was disseminated to the preschool teachers and they were asked to complete the TIS on their students participating in the study. The TIS assessments were independently scored by Observer A and Observer B to check for interscorer agreement.

Phase Three

Phase three was the intervention phase the study. The names of teachers A and B were placed into a container and randomly drawn to assign them to classes in the following order: Hearts, Ladybugs, Butterflies, and Rainbow. Teacher B was randomly assigned to provide the teacher facilitation in the Hearts and Ladybugs classrooms and Teacher A was randomly assigned to provide the teacher facilitation in the Butterflies and Rainbow classrooms. The special education teachers traveled between the classrooms to work with the children in this study.

At the beginning of each session, the special education teacher turned on the computer and started the software program for the dyad to use. The dyads sat next to each other and played on the computer for eight minutes using the Elmo's Art Workshop (1998) software program. The length of eight minutes was selected because this time period has been found to be the optimal time period for children of this age to engage in a computer activity (Boone & Higgins, 1993; Boone, Higgins, Notari, & Stump, 1996).

The children in the teacher facilitated and computer only intervention groups played on the computer for eight minutes, four times a week, over a ten-week time period. These sessions were conducted during the regularly scheduled center time in the classrooms.

In the computer only group, the special education teacher positioned herself five-feet away from the computer station. The teacher interacted with the children only to promote initial engagement in the activity, to redirect excessive negative peer behaviors (e.g., pushing, snatching the mouse, shouting), or to redirect children who attempted to leave the computer station before the eight-minute session ended.

In the teacher facilitated group, the special education teacher sat directly behind the children and provide cues to initiate social interaction (e.g., "____, ask ____ for the mouse.") and respond (e.g., " ____, put Big Bird on the screen with _____.") according to the prompting procedure described by Odom & McConnell (1997) (see Appendix B). The interactions between the children in both groups were videotaped.

Phase Four

After the intervention phase, the preschool teachers completed the TIS as a post-test to reassess each child's social skills. The TIS assessments were scored by Observer A and Observer B to check for interscorer reliability.

All videotapes of the computer session were viewed and the social interaction behaviors of the children coded using the SIOS by Observer A. Observer B reviewed 25% of the tapes and coded the childrens' social behaviors using the SIOS to establish interrater reliability.

All the videotapes were viewed for a second time and the positive and negative social interactions of the children were coded using the Observer Manual by Observer A. Observer C reviewed 25% of the tapes and coded the positive and negative social interactions of the children using the Observer Manual for interrater reliability.

Phase Five

After all data were collected, the teacher facilitators were interviewed separately regarding their perceptions of computer use coupled with adult facilitation to improve the social skills of children with and without disabilities. They were asked the same three questions as in phase one. The interviews were videotaped and transcribed by a transcription service. Responses were coded using domain and componential analyses.

Data Collection

Teacher Impression Scales

The pre-and-post TIS (Odom & McConnell, 1997) assessments were completed by the preschool teachers for each child and were scored. The difference between the pre-and-post intervention TIS scores of the teacher facilitated computer activity and the computer only activity were quantified and compared to ascertain the perceptions of the preschool teachers' regarding the social skills of the children.

Social Interaction Observation System

Videotapes of the dyads during the intervention were viewed and the Social Interaction Observation System (SIOS) (Kreimeyer, et al., 1991) was used to code the occurrence of the 15 social interaction behaviors. After the first minute of each eight-minute session, each child in the dyad was rated over four, one-minute intervals. For each one-minute interval, the social behaviors of one participant in the dyad were marked as occurred and not occurred. This process was repeated for the other participant in the dyad during a second viewing of the tape. The occurrence of each of the 15 behaviors was quantified and analyzed for each participant in the dyad to ascertain the number of times each social behavior was exhibited in the two intervention groups by Observer A. Observer B viewed and rated 25 % of the sessions independently to establish interrater reliability on the rating of behaviors. The interrater reliability was 91% on the SIOS data.

Observer Manual

Positive and negative social interactions of the children in the dyad were recorded using the Observer Manual (Antia et al., 1990). Beginning with the second minute of each eight-minute videotaped session, the social interactions of the dyad were

observed in five-second intervals (five seconds to watch and five seconds to record) over 24-intervals for a total time of four-minutes. The social interactions of one participant in the dyad were rated as no interaction, positive or negative for each five-second interval. This process was repeated for the other participant in the dyad during a second viewing of the tape. The frequencies of positive and negative interactions were quantified and analyzed to ascertain the number of times the students engaged in positive and negative social interactions in the two intervention groups. Observer A viewed and rated the social interactions of the children in all the sessions. Observer C viewed and rated 25 % of the computer sessions to check for interrater reliability. The interrater reliability between the observer and researcher was 96% on the Observer Manual data.

Interrater Reliability

Interrater reliability was calculated by comparing the ratings of Observer A to Observer B and C on 25% of the videotaped computer sessions. Interscorer reliability on the TIS and interrater reliability on the Observer Manual and the SIOS was determine by [agreements / (agreement + disagreements)] x 100 = percent of agreement.

Teacher Interview

The purpose of the teacher interviews was to collect information regarding the perceptions of the special education teachers concerning the use of computer activities and teacher facilitation to increase the social skills of young children. The pre- and post-interviews took place in the staff room of the preschool. Each teacher was asked three open-ended research questions: (1) What are the advantages of using teacher facilitation with a computer activity to teach social skills to children with and without disabilities? (2) What are the disadvantages of using teacher facilitation with a computer activity to

teach social skills to children with and without disabilities? and, (3) For what purposes would you use teacher facilitation and the computer as opposed to other activities to promote social interaction?

The teacher facilitators were encouraged to elaborate on their answers and on their perspectives regarding the use of technology and/or teacher facilitation in the classroom. Notes were taken during the interviews and the interviews were videotaped. The videotapes were transcribed by a professional transcription service to ensure transcription agreement. The responses of the teachers were analyzed using domain and componential analyses to ascertain major themes concerning teacher facilitation and computer activities directed at social skills.

Treatment of the Data

Data from the pre-and-post Teacher Impression Scales (TIS) were analyzed to answer the following questions.

Research Question One: Do the preschool teachers perceive children with and without disabilities in the teacher facilitated computer group as improving their social skills more than the children with and without disabilities in the computer only group?

Analysis: In order to ascertain significant differences between the pre-and-post measurement of social skills for the children with and without disabilities in the two intervention groups, two-way ANOVAs were conducted on the TIS scores of the children. An alpha level of .05 was set.

Data from the Observer Manual were analyzed to answer the following questions.

Research Question Two: Do the children with and without disabilities in the teacher facilitated computer group have more positive and less negative interactions as measured by the Observer Manual than the children with and without disabilities in the computer only group?

Analysis: In order to ascertain significant differences between the social interactions of the children with and without disabilities in the two intervention groups, two-way ANOVAs were conducted to compare positive and negative interactions of the children with and without disabilities in the two intervention groups using the data from the Observer Manual. An alpha level of .05 was set.

Research Question Four: Do older and younger preschool-aged children in the teacher facilitated computer group have more positive and less negative interactions as measured by the Observer Manual than the older and younger children in the computer only group.

Analysis: The children were divided into a younger group (students in Hearts and Ladybugs classrooms) and an older group (students in Butterflies and Rainbow classrooms) for this analysis. In order to ascertain significant differences between the social interactions of the younger and older children in the two intervention groups, two-way ANOVAs were conducted to compare positive and negative interactions of the younger and older children in the two intervention groups using the data from the Observer Manual. An alpha level of .05 was set.

Data from the SIOS were analyzed to answer the following questions:

Research Question Three: Do the children with and without disabilities in the teacher facilitated computer group have more effective and less ineffective social

behaviors as measured by the Social Interaction Observation System than the children with and without disabilities in the computer only group?

Analysis: In order to ascertain a significant difference between the social interaction behaviors of the children with and without disabilities in the two intervention groups, two-way ANOVAs were conducted to compare the individual effective and ineffective social behaviors of the children with and without disabilities in the two intervention groups using the data from the SIOS. An alpha level of .005 was set.

Research Question Five: Do the older and younger preschool-aged children in the teacher facilitated computer group have more effective social behaviors and less ineffective social behaviors as measured by the Social Interaction Observation System than the older and younger children the computer only group?

Analysis: The children were divided into a younger group (students in Hearts and Ladybugs classrooms) and an older group (students in Butterflies and Rainbow classrooms) for this analysis. In order to ascertain significant differences between the social interaction behaviors of the younger and older children in the two intervention groups, two-way ANOVAs were conducted to compare the individual effective and ineffective social behaviors of the younger and older children in the two intervention groups using the data from the SIOS. An alpha level of .005 was set.

Data from the pre-and post-interviews of the special educators were analyzed to answer the following question:

Research Question Six: What are the perceptions of the special education teachers regarding the use of computer activities and teacher facilitation to improve social skills of young children with and without disabilities?

Analysis: The videotaped interviews and notes were reviewed on the same day as the actual interviews. The interview was transcribed by a professional transcription service. The interviews were analyzed using the qualitative technique of domain and componential analyses (Spradley, 1980) to uncover common patterns regarding teacher facilitation and computer activity intervention directed at promoting social skills. Domain and componential analyses were used to organize, compare, and contrast statements by the teacher facilitators regarding the use of teacher facilitation and computer activities to promote social interaction between children in the inclusive classroom.

CHAPTER 4

RESULTS

This study was conducted to investigate the effectiveness of a technology-based intervention coupled with teacher facilitation to improve the social interaction of young children with and without disabilities in an inclusive educational setting. The children were paired into dyads composed of a child with and without a disability. The children participated in a computer only intervention or an intervention that involved the computer and teacher facilitation. Each dyad participated in 24 intervention sessions that were videotaped. The social interactions and social behaviors of the children were recorded from the videotapes using the Observer Manual (Antia, et al. , 1990) and the Social Interaction Observation System (SIOS) (Kreimeyer, et al. , 1991). The preschool teachers' perceptions of the social skills exhibited by the children were measured prior to the intervention and immediately following the study using the Teacher Impression Scales (TIS) (Odom & McConnell, 1997). The special education teachers who participated as the teacher facilitators were interviewed pre-and post-intervention regarding their perceptions of the intervention and the social interaction of the children. Data on the social interactions, social behaviors, and teacher perceptions were compared using quantitative analyses. The teacher facilitators' interviews were analyzed using qualitative analyses.

Interscorer and Interrater Reliability

The social skills of the young children were rated and their social interactions and behaviors were observed and coded by three observers. In order to ensure that the instruments used were scored correctly, reliability checks were conducted on the TIS. Observer Manual, and SIOS scores.

Observer A and Observer B scored all pre and post TIS assessments independently. Their scores were compared and an interscorer reliability was computed Observer A viewed the videotapes of the two intervention groups and rated the social interactions and behaviors of the children using the Observer Manual and the SIOS. Observer B then watched 25% percent of the videotapes and rated the children using the SIOS. In addition, 25% of the videotapes were watched and rated using the Observer Manual by Observer C. Interscorer reliability on the TIS and interrater reliability on the Observer Manual and the SIOS was determine by [agreements / (agreement + disagreements)] x 100 = percent of agreement. Interscorer agreement was 100% on the TIS. Interrater agreement was 96% on the Observer Manual and 91% on the SIOS. Overall reliability scores are presented in Table 6.

Table 6

Interscorer and Interrater Reliability

Source	Observer A	Observer B or C	Percent of Agreement
TIS pretest	2007/2880	2007/2880	2007/2007 = 100%
TIS posttest	2266/2880	2266/2880	2266/2266 = 100%
Observer Manual	595/5184	571/5184	571/595 = 96%
SIOS	4340/12960	3949/12960	3949/4340 = 91%

Teacher Impression Scales

The Teacher Impression Scales (TIS) is a 16-item, five-point Likert scale questionnaire that measures the social skills of children. It was completed by the four preschool teachers before and immediately following the intervention. The data from the TIS were analyzed to answer the following question:

> Do the preschool teachers perceive children with and without disabilities in the teacher facilitated computer group as improving their social skills more than the children with and without disabilities in the computer only group?

It was predicted that the preschool teachers would perceive that the children with and without disabilities in the teacher facilitated group improved their social skills more than the children with and without disabilities in the computer only group. The TIS data, based on the difference between the pre and post-intervention scores, were analyzed using a two-way analysis of variance (ANOVA) to ascertain if there were significant

interaction and main effects between the intervention groups and disability status. Alpha level was set at .05.

A summary of the TIS results is presented in Table 7. Results of the ANOVA indicated that there was no interaction effect between the intervention and disability status of the children, [$F(1,1) = .122, p = .729$] and no main effect for the intervention group, [$F(1,1) = .516, p = .478$]. However there was a significant main effect for the disability status of the children, [$F(1,1) = 4.467, p = .042$].

Table 7

ANOVA Summary for Teacher Impression Scales

Dependent Variable	Source	*F*	*p*
TIS Scores	Group	.516	.478
	Disability Status	4.467	.042*
	Group*Disability Status	.122	.729

* Significant at the $p < .05$ level.

The means and standard deviations for the TIS data are presented in Table 8. The mean scores indicate that the preschool teachers did not perceive that the children in the teacher facilitated computer intervention improved their social skills any more than the children in the computer intervention group. The mean scores and standard deviations

were: teacher facilitated computer intervention ($M = 6.22$, $SD = 8.91$) and computer only intervention ($M = 8.17$, $SD = 7.91$). Concerning disability status, the preschool teachers did perceive that the children with disabilities improved their social skills more than the children without disabilities in both intervention groups. The mean scores and standard deviations were: children with disabilities ($M = 10.06$, $SD = 8.20$) and children without disabilities ($M = 4.33$, $SD = 7.71$).

Table 8

Means and Standard Deviations of Main Effects for TIS Scores

Source	Mean	Standard Deviation
Group		
Teacher Facilitation and Computer (n = 18)	6.22	8.91
Computer Only (n = 18)	8.17	7.91
Disability Status*		
Children with disabilities (n = 18)	10.06	8.20
Children without disabilities (n = 18)	4.33	7.71

* Significant at the $p < .05$ level.

Observer Manual

The Observer Manual is a time interval sampling measure that was used to record the frequency of positive and negative interactions of the children as they participated in the social skill intervention. Observers A and C watched the videotaped sessions of the

dyads participating in the intervention and rated their social interactions using the Observer Manual. The data from the Observer Manual were analyzed to answer the following two questions:

Do the children with and without disabilities in the teacher facilitated computer group have more positive and less negative interactions as measured by the Observer Manual than the children with and without disabilities in the computer only group?

Do older and younger preschool-aged children in the teacher facilitated computer group have more positive and less negative interactions as measured by the Observer Manual than the older and younger children in the computer only group.

It was predicted that the children with and without disabilities in the teacher facilitated computer group would have more positive and less negative interactions while the children with and without disabilities in the computer only group would have less positive and more negative interactions. In addition, it was predicted that the older and younger preschool-aged children would have more positive and less negative interactions in the teacher facilitated computer group while the older and younger preschool-aged children in the computer only group would have less positive and more negative interactions. Lastly, it was predicted that the older children would have more positive and less negative interactions than the younger children.

Observer Manual data were analyzed using two-way ANOVAs to ascertain if there was a significant interaction and main effects between the intervention group and disability status for positive and negative interactions. Alpha level was set at .05.

A summary of the results is presented in Table 9. Results of the ANOVAs indicated that there was no interaction effect between the intervention and disability status of the children for positive interactions, [$F(1,1) = .014, p = .908$] and no main effect for the disability status in positive interactions, [$F(1,1) = .010, p = .920$]. However there was a significant main effect for the intervention group of children, [$F(1,1) = 8.957, p = .005$]. There was no significant interaction effect between the intervention and disability status of the children for negative interactions, [$F(1,1) = .011, p = .919$]. In addition, there were no significant main effects for the intervention group, [$F(1,1) = .006, p = .939$] or disability status, [$F(1,1) = .011, p = .919$].

Table 9

Summary of ANOVAs for Observer Manual Data

Dependent Variable	Source	*F*	*p*
Positive Social Interaction	Group	8.957	.005*
	Disability Status	.010	.920
	Group*Disability Status	.014	.908
Negative Social Interaction	Group	.006	.939
	Disability Status	.011	.919
	Group*Disability Status	.011	.919

* Significant at the $p < .05$ level.

The means and standard deviations for the Observer Manual are presented in Table 10. Mean scores indicated that there was no difference in positive interactions between the children with disabilities ($M = 50.78$, $SD = 25.32$) and the children without disabilities ($M = 50.00$, $SD = 25.05$). However, the children in the teacher facilitated computer intervention group ($M = 61.83$, $SD = 19.56$) had significantly more positive interactions than the children in the computer only group ($M = 38.94$, $SD = 24.68$).

There was no difference in negative interactions between the children with disabilities ($M = 15.50$, $SD = 12.55$) and the children without disabilities ($M = 15.94$, $SD = 12.63$). In addition, there were no significant differences in negative interactions in the teacher facilitated intervention group ($M = 15.89$, $SD = 13.67$) and the computer intervention group ($M = 15.56$, $SD = 11.41$). There were no significant differences in negative interactions of the children regardless of disability status or intervention group assignment.

Table 10

Means and Standard Deviations of Main Effects for the Observer Manual

Dependent Variable	Means	Standard Deviation
Dependent Variable: Positive Interactions		
Intervention Group*		
Teacher Facilitation and Computer (n = 18)	61.83	19.56
Computer Only (n = 18)	38.94	24.68
Disability Status		
Children with disabilities (n = 18)	50.78	25.32
Children without disabilities (n = 18)	50.00	25.05
Dependent Variable: Negative Interactions		
Intervention Group		
Teacher Facilitation and Computer (n = 18)	15.89	13.67
Computer Only (n = 18)	15.56	11.41
Disability Status		
Children with disabilities (n = 18)	15.50	12.55
Children without disabilities (n = 18)	15.94	12.63

* Significant at the $p < .05$ level.

Observer Manual data were then analyzed using two-way ANOVAs to ascertain if there was a significant interaction and main effects between the intervention group and chronological age. Alpha level was set at .05.

A summary of the results is presented in Table 11. Results of the ANOVAs indicated no interaction effect between the intervention and chronological age of the children for positive interactions, [$F(1,1) = .422, p = .521$] and no main effect for the chronological age in positive interactions, [$F(1,1) = 1.931, p = .174$]. However there was a significant main effect for the intervention group of the children in positive interaction, [$F(1,1) = 9.940, p = .004$]. There was no significant interaction effect between the intervention and the chronological age of the children for negative interactions, [$F(1,1) = .414, p = .525$]. In addition, there were no significant main effects for the intervention group, [$F(1,1) = .000, p = .995$] or age, [$F(1,1) = .165, p = .688$].

Table 11

Summary of ANOVAs for Observer Manual Data

Dependent Variable	Source	*F*	*p*
Positive Social Interaction	Group	9.940	.004*
	Age	1.931	.174
	Group*Age	.422	.521
Negative Social Interaction	Group	.000	.995
	Age	.165	.688
	Group*Age	.414	.525

* Significant at the $p < .05$ level.

The means and standard deviations for the Observer Manual main effects of the intervention group and chronological age are presented in Table 12. The mean scores indicated that there was no difference in the positive interactions of the younger (M = 45.80, SD = 25.18) and older children (M = 56.12, SD = 23.91). However, the children in the teacher facilitated computer intervention (M = 61.83, SD = 19.56) group had significantly more positive interactions than the children in the computer intervention group (M = 38.94, SD = 24.68).

There was no differences in negative interactions between the younger children (M = 16.50, SD = 14.10) and the older children (M = 14.75, SD = 10.28). In addition, there were no difference in negative interactions in the teacher facilitated intervention group (M = 15.89, SD = 13.67) and the computer intervention group (M = 15.56, SD = 11.41). There were no significant differences in negative interactions of the children regardless of chronological age or intervention group assignment.

Table 12

Means and Standard Deviations of Main Effects for the Observer Manual

Dependent Variable	Means	Standard Deviation
Dependent Variable: Positive Interactions		
Intervention Group*		
Teacher Facilitation and Computer (n =18)	61.83	19.56
Computer Only (n = 18)	38.94	24.68
Chronological Age (n = 18)		
Younger Children (n = 20)	45.80	25.18
Older Children (n = 16)	56.12	23.91
Dependent Variable: Negative Interactions		
Intervention Group		
Teacher Facilitation and Computer (n = 18)	15.89	13.67
Computer Only (n = 18)	15.56	11.41
Chronological Age		
Younger Children (n = 20)	16.50	14.10
Older Children (n = 16)	14.75	10.28

Significant at the $p < .05$ level.

Social Interaction Observation System

The Social Interaction Observation System (SIOS) is an interval sampling measure that was used to record 15 different social interaction behaviors of the children.

Observers A and B watched the videotaped sessions of the dyads participating in the interventions and rated their social interaction behaviors according to the SIOS. The data from the SIOS were analyzed to answer the following two questions:

Do the children with and without disabilities in the teacher facilitated computer group have more effective and less ineffective social behaviors as measured by the Social Interaction Observation System than the children with and without disabilities in the computer only group?

Do the older and younger preschool-aged children in the teacher facilitated computer group have more effective social behaviors and less ineffective social behaviors as measured by the Social Interaction Observation System than the older and younger children the computer only group?

It was predicted that children with disabilities and without disabilities would have more effective and less ineffective social behaviors in the teacher facilitated computer group while children with and without disabilities in the computer only group would have less effective and more ineffective social behaviors as measured by the SIOS. In addition, it was predicted that the older and younger children in the teacher facilitated computer group would have more effective social behaviors and less ineffective social behaviors while the older and younger children in the computer only group would have less effective social behaviors and more ineffective social behaviors. Lastly, it was predicted that the older children would have more effective and less ineffective social behaviors than the younger children.

Effective behaviors on the SIOS are: child engages in positive interaction with peers, child engages in parallel play, child engages in associative and/or cooperative play, child

engages in positive linguistic interaction, peer initiates interaction towards child. children responds positively to peer, child initiates interaction towards peer, and peer responds positively to child's initiation. Ineffective behaviors on the SIOS are: child directs negative behaviors to the peer, child engages in nonplay behavior, child engages in solitary play, child responds negatively to peer, child makes no response to peer, peer responds negatively to child, and peer makes no response.

SIOS data were analyzed using two-way ANOVAs to ascertain if there was a significant interaction and main effects between the intervention group and disability status. To guard against a Type I error due to the use of repeated ANOVAs on the SIOS data, the p value was set at .005 for this analysis.

A summary of the results is presented in Table 13. Results from the ANOVAs indicated there were no significant interaction effects between intervention group and disability status on the 15 social interaction behaviors. Also, there were no significant main effects for disability status on the 15 social interaction behaviors indicating that the children with disabilities did not perform differently from the children with disabilities on the SIOS interaction behaviors. However, there were significant main effects for the intervention group in seven of the social interaction behaviors. These included the dependent variables: positive interaction, [$F(1,1) = 33.560, p = .000$], associative and/or cooperative play, [$F(1,1) = 34.784, p = .000$], positive linguistic, [$F(1,1) = 24.568, p = .000$], peer initiates interaction, [$F(1,1) = 14.423, p = .001$], child responds positively, [$F(1,1) = 24.403, p = .000$], child initiates interaction, [$F(1,1) = 13.664, p = .001$], and peer responds positively, [$F(1,1) = 22.897, p = .000$]. Two dependent variables approached significance for the main effect for intervention group. These were child makes no

response, [F (1,1) = 9.291, p = .005] and peer makes no response, [F (1,1) = 8.545, p = .006].

Table 13

Summary of ANOVAs for the SIOS

Dependent Variable	Source	*F*	*p*
1. Positive Interactions			
	Group	33.560	.000*
	Disability Status	.002	.965
	Group*Disability	.002	.965
2. Negative Behaviors			
	Group	.020	.889
	Disability Status	.061	.807
	Group*Disability	.446	.509
3. Nonplay Behaviors			
	Group	5.492	.025
	Disability Status	.885	.354
	Group*Disability	.213	.647
4. Solitary Play			
	Group	.119	.732
	Disability Status	1.075	.308
	Group*Disability	.119	.732

Table continues

5. Parallel Play			
	Group	4.302	.046
	Disability Status	.053	.819
	Group*Disability	.478	.494
6. Associative and/or Cooperative			
	Group	34.784	.000*
	Disability Status	.001	.973
	Group*Disability	.001	.973
7. Positive Linguistic			
	Group	24.568	.000*
	Disability Status	.002	.962
	Group*Disability	.004	.947
8. Peer initiates interaction			
	Group	14.423	.001*
	Disability Status	.011	.916
	Group*Disability	2.631	.115
9. Child responds positively			
	Group	24.403	.000*
	Disability Status	.267	.609
	Group*Disability	.007	.932

Table continues

10. Child responds negatively			
	Group	.217	.644
	Disability Status	1.183	.285
	Group*Disability	2.178	.150
11. Child makes no response			
	Group	9.291	.005
	Disability Status	.262	.612
	Group*Disability	5.633	.024
12. Child initiates interaction			
	Group	13.664	.001*
	Disability Status	.000	.992
	Group*Disability	2.817	.103
13. Peer responds positively			
	Group	22.897	.000*
	Disability Status	.318	.577
	Group*Disability	.025	.875

Table continues

14. Peer responds negatively			
	Group	.062	.805
	Disability Status	.691	.412
	Group*Disability	3.045	.091
15. Peer makes no response			
	Group	8.545	.006
	Disability Status	.353	.557
	Group*Disability Status	6.109	.019

*Significant at the $p < .005$ level.

The means and standard deviations for the SIOS main effects of the intervention group and disability status are presented in Table 14. Mean scores indicated that the children with disabilities and without disabilities did not perform differently on the social behaviors that were recorded with the SIOS. Mean scores indicated that the children in the teacher facilitated computer intervention had significantly more positive interactions ($M = 60.22$, $SD = 14.38$), associative and/or cooperative play ($M = 60.22$, $SD = 14.50$), positive linguistic interactions ($M = 58.44$, $SD = 17.87$), peer initiations ($M = 59.44$, $SD = 18.13$), positive child responses during the interactions ($M = 37.17$, $SD = 12.50$), child initiations ($M = 59.17$, $SD = 18.09$), and positive peer responses ($M = 36.83$, $SD = 11.99$) than the children in the computer only intervention. In addition, mean scores indicated

that the children in the teacher facilitation computer intervention group had more peer makes no responses ($M = 37.94$, $SD = 15.11$) and child makes no response ($M = 39.22$, $SD = 15.00$) even though these behaviors did not reach a significant level of difference.

Table 14

Means and Standard Deviations of the Main Effects for the SIOS

Dependent Variables	Means	Standard Deviation
1. Positive Interactions		
Intervention Group*		
Teacher Facilitation and Computer (n = 18)	60.22	14.38
Computer Only (n = 18)	30.89	15.09
Disability Status		
Children with disabilities (n = 18)	45.67	20.90
Children without disabilities (n = 18)	45.44	21.28
2. Negative Behaviors		
Intervention Group		
Teacher Facilitation and Computer (n = 18)	8.56	9.75
Computer Only (n = 18)	9.00	8.76
Disability Status		
Children with disabilities (n = 18)	8.39	8.84
Children without disabilities (n = 18)	9.17	9.67

Table continues

3. Nonplay Behaviors		
Intervention Group		
Teacher Facilitation and Computer (n = 18)	14.39	9.36
Computer Only (n = 18)	22.00	9.86
Disability Status		
Children with disabilities (n = 18)	19.72	9.75
Children without disabilities (n = 18)	16.67	10.75
4. Solitary Play		
Intervention Group		
Teacher Facilitation and Computer (n = 18)	2.00	2.35
Computer Only (n = 18)	2.33	3.29
Disability Status		
Children with disabilities (n = 18)	2.67	3.36
Children without disabilities (n = 18)	1.67	2.14
5. Parallel Play		
Intervention Group		
Teacher Facilitation and Computer (n = 18)	93.78	2.10
Computer Only (n = 18)	91.78	3.41
Disability Status		
Children with disabilities (n = 18)	92.89	2.87
Children without disabilities (n = 18)	92.67	3.14

Table continues

6. Associative and/or Cooperative Play		
Intervention Group*		
Teacher Facilitation and Computer (n = 18)	60.22	14.50
Computer Only (n = 18)	31.06	14.28
Disability Status		
Children with disabilities (n = 18)	45.72	20.66
Children without disabilities (n = 18)	45.56	20.92
7. Positive Linguistic		
Intervention Group*		
Teacher Facilitation and Computer (n = 18)	58.44	17.87
Computer Only (n = 18)	29.50	16.07
Disability Status		
Children with disabilities (n = 18)	43.83	22.73
Children without disabilities (n = 18)	44.11	22.46
8. Peer initiates interaction		
Intervention Group*		
Teacher Facilitation and Computer (n = 18)	59.44	18.13
Computer Only (n = 18)	37.72	16.47
Disability Status		
Children with disabilities (n = 18)	48.28	21.10
Children without disabilities (n = 18)	48.89	20.11

Table continues

9. Child responds positively		
Intervention Group*		
Teacher Facilitation and Computer (n = 18)	37.17	12.50
Computer Only (n = 18)	18.06	9.98
Disability Status		
Children with disabilities (n = 18)	28.61	14.55
Children without disabilities (n = 18)	26.61	15.34
10. Child responds negatively		
Intervention Group		
Teacher Facilitation and Computer (n = 18)	5.06	4.75
Computer Only (n = 18)	4.39	3.97
Disability Status		
Children with disabilities (n = 18)	3.94	4.11
Children without disabilities (n = 18)	5.50	4.51
11. Child makes no response		
Intervention Group		
Teacher Facilitation and Computer (n = 18)	39.22	15.00
Computer Only (n = 18)	24.67	15.24
Disability Status		
Children with disabilities (n = 18)	30.72	17.53
Children without disabilities (n = 18)	33.17	16.10

Table continues

12. Child initiates interaction		
Intervention Group*		
Teacher Facilitation and Computer (n = 18)	59.17	18.09
Computer Only (n = 18)	38.00	16.65
Disability Status		
Children with disabilities (n = 18)	48.56	19.42
Children without disabilities (n = 18)	48.61	21.55
13. Peer responds positively		
Intervention Group*		
Teacher Facilitation and Computer (n = 18)	36.83	11.99
Computer Only (n = 18)	18.44	10.44
Disability Status		
Children with disabilities (n = 18)	26.56	14.77
Children without disabilities (n = 18)	28.72	14.53
14. Peer responds negatively		
Intervention Group		
Teacher Facilitation and Computer (n = 18)	4.83	4.30
Computer Only (n = 18)	4.50	3.91
Disability Status		
Children with disabilities (n = 18)	5.22	4.24
Children without disabilities (n = 18)	4.11	3.91

Table continues

15. Peer makes no response

Intervention Group		
Teacher Facilitation and Computer (n = 18)	37.94	15.11
Computer Only (n = 18)	24.28	14.72
Disability Status		
Children with disabilities (n = 18)	32.50	15.25
Children without disabilities (n = 18)	29.72	17.53

*Significant at the $p < .005$ level.

The SIOS data were then analyzed using two-way ANOVAs to ascertain if there was a significant interaction and main effects between the intervention group and chronological age of the children. There were 20 children who participated in the study from Hearts and Ladybugs (the classrooms for the younger children) and 16 children from Butterflies and Rainbow (the classroom for the older children). The age range of the younger children (n =20) was 2-years and 11-months to 3-years and 11-months. The older children (n = 16) were between 4-years to 5-years and 10-months of age. To guard against a Type I error due to the repeated use of ANOVAs on the SIOS data, the p value was set of <.005 for this analysis.

A summary of results is presented in Table 15. Results of the ANOVAs indicated that there were no significant interaction effects between intervention group and the chronological age of the children on the 15 SIOS social interaction behaviors. However, there were significant main effects for chronological age in six of the effective social interaction behaviors. These included the dependent variables positive interaction, [F

(1,1) = 15.739, p = .000], associative and/or cooperative play, [F (1,1) = 13.991, p = .001], positive linguistic, [F (1,1) = 15.415, p = .000], child responds positively, [F (1,1) = 10.756, p = .003], child initiates interaction, [F (1,1) = 10.812, p = .002], peer responds positively, [F (1,1) = 12.660, p = .001]. There was also a significant main effect for age in the ineffective social interaction behaviors: peer makes no response, [F (1,1) = 10.153, p = .003]. In addition, two dependent variables were close to reaching significance for age main effect. These were peer initiates interaction, [F (1,1) = 8.946, p = .005] and child makes no response, [F (1,1) = 9.133, p = .005].

There were significant main effects for the intervention group in seven of the effective social interaction behaviors. These included the dependent variables: positive interaction, [F (1,1) = 49.500, p = .000], associative and/or cooperative [F (1,1) = 50.166, p = .000], positive linguistic, [F (1,1) = 36.164, p = .000], peer initiates interaction, [F (1,1) = 17.056, p = .000], child responds positively, [F (1,1) = 32.896, p = .000], child initiates interaction, [F (1,1) = 16.948, p = .000], and peer responds positively, [F (1,1) = 32.047, p = .000]. There also were significant main effects for intervention group in two of the ineffective social interaction behaviors. These were child makes no response, [F (1,1) = 10.005, p = .003] and peer makes no response, [F (1,1) = 9.388, p = .004].

Table 15

Summary of ANOVAs for the SIOS

Dependent Variable	Source	*F*	*p*
1. Positive Interaction			
	Group	49.500	.000*
	Age	15.739	.000*
	Group*Age	.001	.972
2. Negative Behaviors			
	Group	.052	.821
	Age	.008	.931
	Group*Age	.633	.432
3. Nonplay Behaviors			
	Group	6.934	.013
	Age	7.615	.009
	Group*Age	.420	.522
4. Solitary Play			
	Group	.375	.545
	Age	2.013	.166
	Group*Age	4.708	.038

Table continues

5. Parallel Play			
	Group	5.005	.032
	Age	3.070	.089
	Group*Age	.530	.472
6. Associative and/or Cooperative			
	Group	50.166	.000*
	Age	13.991	.001*
	Group*Age	.159	.693
7. Positive Linguistic			
	Group	36.164	.000*
	Age	15.415	.000*
	Group*Age	.023	.882
8.Peer initiates interaction			
	Group	17.056	.000*
	Age	8.946	.005
	Group*Age	.047	.829
9. Child responds positively			
	Group	32.896	.000*
	Age	10.756	.003*
	Group*Age	.326	.572

Table continues

10. Child responds negatively			
	Group	.113	.739
	Age	.113	.739
	Group*Age	1.017	.321
11. Child makes no response			
	Group	10.005	.003*
	Age	9.133	.005
	Group*Age	.004	.951
12. Child initiates interaction			
	Group	16.948	.000*
	Age	10.812	.002*
	Group*Age	.115	.736
13. Peer responds positively			
	Group	32.047	.000*
	Age	12.660	.001*
	Group*Age	.261	.613

Table continues

14. Peer responds negatively			
	Group	.028	.867
	Age	.256	.616
	Group*Age	.375	.544
15. Peer makes no response			
	Group	9.388	.004*
	Age	10.153	.003*
	Group*Age	.037	.849

* Significant at the $p < .005$ level.

Table 16 contains the means and standard deviations for the SIOS main effects. The mean scores indicate that the older preschool children had significantly more instances of positive interactions ($M = 54.75$, $SD = 17.67$), associative and/or cooperative play ($M = 54.25$, $SD = 18.75$), positive linguistic interaction ($M = 54.50$, $SD = 17.86$), positive child responses ($M = 33.75$, $SD = 14.13$), child initiations ($M = 58.06$, $SD = 18.05$), and positive peer responses ($M = 34.13$, $SD = 13.75$) during the interactions than the younger children. In addition, the older children had more positive peer initiations than the younger children even though this behavior did not reach a significant level of difference.

For ineffective behaviors, the older preschool children had significantly more peer makes no response ($M = 39.06$, $SD = 15.80$) during the interactions than younger

preschool children ($M = 24.75$, $SD = 13.92$). In addition, the older children almost had significantly more child makes no responses ($M = 39.69$, $SD = 16.48$) than the younger children ($M = 25.75$, $SD = 14.29$).

The mean scores indicate that the children in the teacher facilitated computer intervention group had significantly more instances of positive interactions, associative and/or cooperative play, positive linguistic interactions, peer initiations, positive child responses, child initiations, and positive peer responses during their social interactions than the children in the computer intervention alone. However, the children in the teacher facilitated computer group also had significantly more no responses from the child and from the peer during the interactions than the children in the computer intervention alone. In short, the children who received the teacher facilitation had more effective social interaction behaviors, but they also had more no responses during the interactions.

Table 16

Means and Standard Deviations of the Main Effects for the SIOS

Dependent Variable	Means	Standard Deviation
1. Positive Interactions		
Intervention Group*		
Teacher Facilitation and Computer (n = 18)	60.22	14.38
Computer Only (n = 18)	30.89	15.09
Age Group*		
Younger Children (n = 20)	38.20	20.54
Older Children (n = 16)	54.75	17.67
2. Negative Behaviors		
Intervention Group		
Teacher Facilitation and Computer (n = 18)	8.56	9.75
Computer Only (n = 18)	9.00	8.76
Age Group		
Younger Children (n = 20)	8.90	10.25
Older Children (n = 16)	8.63	7.86

Table continues

3. Nonplay Behaviors		
Intervention Group		
Teacher Facilitation and Computer (n = 18)	14.39	9.36
Computer Only (n = 18)	22.00	9.86
Age Group		
Younger Children (n = 20)	14.55	10.50
Older Children (n = 16)	22.75	8.05
4. Solitary Play		
Intervention Group		
Teacher Facilitation and Computer (n = 18)	2.00	2.35
Computer Only (n = 18)	2.33	3.29
Age Group		
Younger Children (n = 20)	1.60	2.16
Older Children (n = 16)	2.88	3.42
5. Parallel Play		
Intervention Group		
Teacher Facilitation and Computer (n = 18)	93.78	2.10
Computer Only (n = 18)	91.78	3.41
Age Group		
Younger Children (n = 20)	93.50	2.31
Older Children (n = 16)	91.88	3.50

Table continues

6. Associative and/or Cooperative play		
Intervention Group*		
Teacher Facilitation and Computer (n = 18)	60.22	14.50
Computer Only (n = 18)	31.06	14.28
Age Group*		
Younger Children (n = 20)	38.75	19.59
Older Children (n = 16)	54.25	18.75
7. Positive Linguistic		
Intervention Group*		
Teacher Facilitation and Computer (n = 18)	58.44	17.87
Computer Only (n = 18)	29.50	16.07
Age Group*		
Younger Children (n = 20)	35.55	22.22
Older Children (n = 16)	54.50	17.86
8. Peer initiates an interaction		
Intervention Group*		
Teacher Facilitation and Computer (n = 18)	59.44	18.13
Computer Only (n = 18)	37.72	16.47
Age Group		
Younger Children (n = 20)	41.55	19.47
Older Children (n = 16)	57.38	18.29

Table continues

9. Child responds positively		
Intervention Group*		
Teacher Facilitation and Computer (n = 18)	37.17	12.50
Computer Only (n = 18)	18.06	9.98
Age Group*		
Younger Children (n = 20)	22.70	13.68
Older Children (n = 16)	33.75	14.13
10. Child responds negatively		
Intervention Group		
Teacher Facilitation and Computer (n = 18)	5.06	4.75
Computer Only (n = 18)	4.39	3.97
Age Group		
Younger Children (n = 20)	4.50	4.51
Older Children (n = 16)	5.00	4.21
11. Child makes no response		
Intervention Group*		
Teacher Facilitation and Computer (n = 18)	39.22	15.00
Computer Only (n = 18)	24.67	15.24
Age Group*		
Younger Children (n = 20)	25.75	14.29
Older Children (n = 16)	39.69	16.48

Table continues

12. Child initiates interaction		
Intervention Group*		
Teacher Facilitation and Computer (n = 18)	59.17	18.09
Computer Only (n = 18)	38.00	16.65
Age Group*		
Younger Children (n = 20)	41.00	18.96
Older Children (n = 16)	58.06	18.05
13. Peer responds positively		
Intervention Group*		
Teacher Facilitation and Computer (n = 18)	36.83	11.99
Computer Only (n = 18)	18.44	10.44
Age Group*		
Younger Children (n = 20)	22.45	13.17
Older Children (n = 16)	34.13	13.75
14. Peer responds negatively		
Intervention Group		
Teacher Facilitation and Computer (n = 18)	4.83	4.30
Computer Only (n = 18)	4.50	3.91
Age Group		
Younger Children (n = 20)	4.35	4.27
Older Children (n = 16)	5.06	3.87

Table continues

15. Peer makes no response

Intervention Group*		
Teacher Facilitation and Computer (n = 18)	37.94	15.11
Computer Only (n = 18)	24.28	14.72
Age Group*		
Younger Children (n = 20)	24.75	13.92
Older Children (n = 16)	39.06	15.80

* Significant at the $p < .005$ level.

Teacher Facilitator Interviews

The two special education teachers who participated in the study as the teacher facilitators were interviewed before the intervention phase of this study and immediately following the conclusion of the study. They were asked the following questions in both the pre-and post-interviews.

1. What are the advantages of using teacher facilitation with a computer activity to teach social skills to children with and without disabilities?
2. What are the disadvantages of using teacher facilitation with a computer activity to teach social skills to children with and without disabilities?
3. For what purposes would you use teacher facilitation and the computer as opposed to other activities to promote social interaction?

The teachers were encouraged to elaborate on their answers and on their perspective regarding the use of technology and teacher facilitation in the preschool classroom. Notes were taken during the interviews and the interviews were videotaped. Even though

the teachers were allowed as much time as they wished to answer the questions. the pre-interviews were approximately ten minutes in length and the post-interviews were approximately 20 minutes in length. The interviews were transcribed by a professional transcription service. Observer A checked for accuracy of the transcription by listening to the interviews and reading the transcription. The interviews were analyzed to answer the following question:

> What are the perceptions of special education teachers regarding the use of computer activities and teacher facilitation to improve social skills of young children with and without disabilities?

The analysis of the teachers' responses involved the repeated reading of the transcription and the organization of the responses using domain and componential analyses. The domains were extrapolated from the semantic relationships used in ethnographic research (Spradley, 1980). Table 17 and 18 contains the cultural domains that occurred in the pre and post-interviews based on the semantic relationships (e.g., inclusion , spatial, cause-effect, function, mean-end, sequence, and characteristics) described by Spradley (1980).

Table 17

Cultural Domains from Teacher Pre-interviews

Semantic Relationship	Form	Example of Cultural Domains
Inclusion	X is a kind of Y	A child with a disability (is a kind of) student.
		A child without a disability (is a kind of) student.
		Teacher facilitation (is a kind of) teaching method.
Spatial	X is a place in Y	The computer center (is a place in) the preschool classroom.
Cause-effect	X is a result of Y	Being a friend (is a result of) time spent together.
		Having friendships (is a result of) developing social skills.
		Social interaction (is a result) of the abilities and temperaments of the children.
Function	X is used for Y	Computers (are used for) learning cause and effect.
		Teacher facilitation (is used for) helping students communicate with their peers.
Mean-end	X is a way to do Y	Sharing (is a way) to interact.
		Taking turns (is a way) to interact.
Sequence	X is a step in Y	Initiating a social contact (is a step in) interacting.

Table 18

Cultural Domains from Teacher Post-interviews

Semantic Relationship	Form	Example of Cultural Domains
Inclusion	X is a kind of Y	Allowing students time to respond (is a kind of) teaching method.
Cause-effect	X is a result of Y	Being patient (is a result of) time spent together. Having better social skills (is a result of) teacher's help. Social interaction (is a result) of the abilities and temperaments of the children.
Function	X is used for Y	Computers (are used for) learning basic concepts, colors, counting, problem solving, decision making, and negotiating with peers. Teacher facilitation (is used for) helping students turn take, initiate, and maintain social interactions.
Mean-end	X is a way to do Y	Working together (is a way) to interact. Dancing to the music from the computer (is a way) to interact. Making something together on the computer (is a way) to interact.

Table continues

Sequence	X is a step in Y	Turning on the computer (is a step in) playing.
		Choosing a game (is a step in) playing.
		Turn taking (is a step in) playing together.
Characteristic	X is a	Patience (is a characteristic of) teacher facilitation.
	characteristic	Feedback (is a characteristic of) computer programs.
	of Y	Patience (is a characteristic of) children's social
		interactions.
		Familiarity (is a characteristic of) friendships.
		Proximity (is a characteristic of) friendships.

From the common semantic relationships identified, there were four central domains revealed. These included friendships among children with and without disabilities, social interactions, teacher facilitation, and computer activities. Componential analyses were used to organize the central domains by examining the dimensions of contrast (Spradley, 1980). Table 19 and 20 contains the componential analyses of the domain of teacher facilitation. Advantages and disadvantages of the teacher facilitation and no teacher facilitation on the social interactions of young children were extrapolated from the pre and post-interviews.

Table 19

Componential Analysis of Teacher Facilitation Based on Pre-interviews

Domain	Dimensions of Contrast as Identified by the Teachers	
	Advantages	Disadvantages
Teacher Facilitation of Social Interactions of Young children	1. Promotes interactions that are not occurring. 2. Models socially appropriate interactions. 3. Repairs a breakdown of communication between the children.	1. May create an artificial social exchange. 2. Requires time. 3. Teachers may inadvertently intervene more than necessary.
No Teacher Facilitation of Social Interactions of Young Children	1. Does not require the teacher's time. 2. Allows children to work out conflicts independently.	1. Allows one child to dominate the activity.

Table 20

Componential Analysis of Teacher Facilitation Based on Post-interviews

Domain	Dimensions of Contrast as Identified by the Teachers	
	Advantages	Disadvantages
Teacher Facilitation of Social Interactions of Young children	1. Effective with children with limited verbal skills. 2. Increases tolerance and patience of children without disabilities. 3. Prompting procedure maximizes opportunities for peer interaction. 4. Children without disabilities learn to read cues of the children with disabilities and respond accordingly. 5. More generalization of friendships.	1. Requires close proximity. 2. Requires time to learn to implement effectively. 3. More effective with children who are responsive to teacher directed activities. 4. Teachers are required to be familiar with children's abilities. 5. Teachers need to fade prompts appropriately.
No Teacher Facilitation of Social Interactions	1. Able to observe natural peer social interactions of children.	1. Does not show children new ways of interacting.

Table continues

of Young Children	2. Allows children to self discover. 3. Effective for some children with and without disabilities who have good verbal skills. 4. Generalization of friendships.	2. Does not address the children's weaknesses. 3. May not be effective with children with significant language problems. 4. Children without disabilities become intolerant/impatient of the children with disabilities.

Table 21 and 22 contains the componential analysis on the domain of computer activities. Advantages and disadvantages of using computer activities to facilitate social interactions of young children were extrapolated from the pre and post-interviews.

Table 21

Componential Analysis of Computer Activities Based on Pre-interviews

Domain	Dimensions of Contrast as Identified by the Teachers	
	Advantages	Disadvantages
Computer Center/Software Activities Used to Facilitate Social Interaction	1. Computer center is a popular center for preschool children.	1. Technical difficulties with printing or accessing software programs. 2. Does not allow for the full range of sociodramatic play. 3. Children may be too engaged in the activity to interact with their peers.

Table 22

Componential Analysis of Computer Activities Based on Post-interviews

Domain	Dimensions of Contrast as Identified by the Teachers	
	Advantages	Disadvantages
Computer Center/Software Activities Used to Facilitate Social Interaction	1. Computer center has physical boundaries. 2. Access to computer activity makes children with disabilities more desirable to children without disabilities. 3. Software activities provided a high level of visual, auditory, and cause and effect feedback. 4. Only a small group (2 peers) allowed at computer center maximizes opportunities for social interaction.	1. Difficult for teachers to pace the activity. 2. Teacher must be familiar with computer and software program(s). 3. Only one child can be in control of the mouse at one time. 4. Must have appropriate software that allows for creativity and choices. 5. Some children may need adaptive equipment to use the computer effectively. 6. Computer activities do not require peer interaction.

Table continues

5. Software activities conducive to constructing products together.
6. Software activities provide enough creative choices for sociodramatic play.
7. Computer activities are conducive to take turns.
8. Children enjoyed printing their creations.
9. Children learn basic concepts such as colors, counting, shapes, and positions.
10. Children improved their mouse skills and comfort level with the computer.

Table continues

11. Computer activities are conducive to peer-mediated instruction.
12. Children continue to play together after their computer time.
13. Computer activities are conducive to peer negotiation and decision making.
14. Children who have difficulty with other centers can use computer with adaptive equipment.

Tables 23 and 24 contains the componential analyses of the domain of friendship. Actions of the children related to friendship were extrapolated from the pre and post-interviews with the teacher facilitators.

Table 23

Componential Analysis of Friendship Based on Pre-interviews

Domain	Dimension of Contrast as Identified by the Teachers
	Actions
Children who are friends	1. Play together during different activities.
Children who are not friends	1. Do not play together on a regular basis.

Table 24

Componential Analysis of Friendship Based on Post-interviews

Domain	Dimensions of Contrast as Identified by the Teachers
	Actions
Children who are friends	1. Ask for each other by name. 2. Seek each other out. 3. Follow each other. 4. Share materials. 5. Get into mischief together. 6. Miss each other. 7. Show interest in each other. 8. Share friends. 9. Maintain proximity.
Children who are not friends	1. Do not ask for each other. 2. Do not follow each other. 3. Do not share materials. 4. Do not miss each other. 5. Do not maintain proximity.

Tables 25 and 26 contain the componential analyses of the domain of social interaction between the two children during computer activities. Effective and ineffective behaviors of the children were extrapolated from the pre and post-interviews of the teacher facilitators.

Table 25

Componential Analysis of Social Interaction Based on Pre-interviews

Domain	Dimensions of Contrast as Identified by the Teachers	
	Effective	Ineffective
Social Interaction Between Young Children During Computer Activities	1. Sharing. 2. Verbal exchanges.	1. Dominating. 2. Flat or hostile affect.

Table 26

Componential Analysis of Social Interaction Based on Post-interviews

Domain	Dimensions of Contrast as Identified by the Teachers	
	Effective	Ineffective
Social Interaction Between Young Children During Computer Activities	1. Helping. 2. Eye contact. 3. Smiling. 4. Waiting for a turn.	1. Ignoring. 2. Wandering 3. Silence. 4. Impatience.

CHAPTER 5

DISCUSSION

While the social development of young children has received attention since the early 1930s (Parten, 1932), the social competence of young children with disabilities has received attention in early childhood education only for the last twenty years (Cavallaro & Porter,1980; Lancioni, 1982). Much of the early research in this area focused on interventions for children with disabilities in self-contained settings. More recently, investigations have begun to explore the social competence and integration of children in inclusive early childhood settings (Buysse, 1993; Hall, 1994). The research findings indicate that even though young children with disabilities are able to achieve social acceptability, they have less frequent and less successful social interactions than their peers without disabilities (Evan et al., 1992; Guralnick et al., 1995; Hanline, 1993)

Currently, early childhood research is focusing on intervention strategies to increase the social competence of children with disabilities in inclusive settings (Hyatt, 2000; Odom et al., 1999). The inclusionary setting is considered to be best practice for young children with disabilities (Bricker, 2000; Odom, 2000). Within this setting, social skill intervention is categorized as environmental arrangement, child specific instruction, peer-mediated instruction, or a combination of the three methods (DeKlyen & Odom, 1989; Odom et al., 1986; Odom et al., 1999). Researchers have used assistive technology, specifically computer activities, as a forum for social interaction among

young children (McCormick, 1987; Spiegel-McGill et al., 1989). Preliminarily research with this intervention indicates that young children enjoy using the computer together and that they do not socially isolate themselves during the activity (Howard et al., 1996; McCormick, 1987). However, there is no research that specifically examines the role of the teacher as a social facilitator during computer activities for young children. In this study, the teacher facilitator offered prompts to both the child with the disability and his/her peer without a disability. In this manner the facilitation was considered both child specific and peer mediated.

The purpose of the present study was to investigate the effectiveness of computer activities coupled with teacher facilitation to increase the social skills of young children with and without disabilities in inclusive classrooms. The premise behind the study was that young children with disabilities would increase their social skills when provided with an intervention that combined the environmental arrangement of highly motivating computer activities with peer-mediated instruction from a peer without a disability. In addition, it was believed that children with disabilities would demonstrate higher social competence as a result of teacher social facilitation during the computer activity.

It also was predicted that the outcome of the intervention would be mediated by the age of the child. It was anticipated that older preschool children would be more socially engaged than the younger children due to their maturation and language skills.

This study involved four classrooms in an inclusive preschool on a university campus. Eighteen dyads of children with and without disabilities completed 24 sessions of either computer intervention or teacher facilitated computer intervention. Half of the dyads received the computer intervention that consisted of 8-minute sessions of

uninterrupted computer activities with open-ended software. The other half of the dyads received the same computer intervention coupled with teacher facilitation of social skills. This study was similar to the work completed by McCormick (1987) and Spiegel-McGill et al. (1989) who used dyads of children engaged in computer activities and to Butz (1999) and Hyatt (2000) who used teacher facilitation of social skills. It also expands previous work by using a larger group of children with and without disabilities and considers additional factors such as the role of teacher, different social behaviors for both children with and without the disabilities, and the impact of the chronological age upon the social interactions.

Perceptions of the Preschool Teachers

Question one dealt with the perceptions of the preschool teachers concerning the interaction effect of the intervention (teacher facilitation and computer activities versus computer activities alone) and disability status on the social skills of the children. It was predicted that the preschool teachers would perceive that the children with and without disabilities in the teacher facilitated group improved their social skills more than the children with and without disabilities in the computer only group.

The four participating preschool teachers filled out the Teacher Impression Scales (TIS) (McConnell & Odom, 1993) on each of their students before and after the intervention. They were unaware of the intervention group assignment of the children. Based on the TIS scores, the teachers did not perceive differential improvement of social skills for the children in the teacher facilitated intervention group versus the computer only group. However, the data from the TIS indicated that the children with disabilities

were perceived by the preschool teachers as improving their social skills significantly more than the children without disabilities in both of the intervention groups (teacher facilitated computer activity versus computer only activity).

The data from individual students provide a clearer picture of the teachers' perceptions. Four of the students improved more than 18 points out of a possible 80 points on the TIS. Three students with disabilities (Intesar improved 31 points, Sam improved 23 points, and James improved 19 points) and one student without disabilities (Donovan improved 19 points) were perceived by the teachers as exhibiting large positive changes in their social skill behavior. The three students with disabilities accounted for a large amount of the social skill improvement for all of the 18 children with disabilities. It is possible that these outliers influenced the total group performance of the children with disabilities as perceived by the teachers in their TIS ratings.

Even though the children with disabilities were perceived by their teachers as exhibiting greater gains than their typical peers, regardless of intervention, this finding needs further corroborating evidence. It may be that the teachers' perceptions were based more on a Hawthorne effect rather than an actual change in the social behavior of the children. The teachers may have been biased by their knowledge of which students had disabilities in their classroom. In addition, the children with disabilities had more room to improve their TIS scores with a pretest mean of 43 points out of a possible of 80 points. The children without disabilities had a pretest mean of 69 points.

As used in this study, The TIS is a rating scale based on the perceptions of the teachers and did not rely on the direct observational data collected on the social behaviors of the children. Therefore, it may be less accurate that the observational data collected

from the Observer Manual and the Social Interaction Observation System. This may be an explanation to why the teachers were unable to distinguish those children in the teacher facilitated computer group versus the children in the computer activity only group.

Positive and Negative Interactions of Children With and Without Disabilities During Computer Activities Versus Teacher Facilitated Computer Activities

Question two dealt with the positive and negative social interactions of the children as measured by the Observer Manual (Antia et al., 1990). The focus of this question was on the interaction effect of the intervention (teacher facilitation and computer activities versus computer activities alone) and disability status on the social interactions of the children. It was predicted that the children with and without disabilities in the teacher facilitated group would have more positive and less negative interactions while children with and without disabilities in the computer only group would have less positive and more negative interactions.

Observers A and C used the Observer Manual to record the occurrence of negative and positive child interactions during five second intervals for all of the 24 sessions for each child in the study. As predicted, the results indicated that there were more positive interactions between the children with and without disabilities in the teacher facilitation computer activity compared to the computer activity alone. The teacher facilitation was successful in increasing the number of positive interactions between the child with a disability and the child without a disability during the computer activities. There were no significant differences between the number of positive

interactions of the children with disabilities and the children without disabilities indicating that the positive interactions were reciprocal between the children in the dyads. Both of the children in the dyads were successfully initiating and responding to each other while engaged in the computer activities.

Negative interactions between the children occurred less frequently in this study than did positive interactions. There were no significant differences in the negative interactions for the children with and without disabilities and no significant differences between two intervention groups. Fourteen of the 36 children who participated in the study had less than ten occurrences of negative social interactions during the 24 intervention sessions. This low number of negative interactions is consistent with findings from other studies concerning the social interaction among young children with and without disabilities (Jenkins et al., 1989; Hanline, 1993). Because the frequencies of negative interactions were low, there may not have been enough opportunity or need for the teacher to redirect negative interactions. Based on these findings regarding the low occurrence of negative interactions, it may be more important for the teacher to focus teaching interventions on the promotion of non-occurring prosocial interactions rather than on circumvention of negative interactions in inclusive classrooms.

Effective and Ineffective Social Behaviors of Children With and Without Disabilities During Computer Activities versus Teacher Facilitated Computer Activities

Question three dealt with the social interaction behaviors of the children as measured by the Social Interaction Observation Scale (SIOS) (Kreimeyer et al., 1991) concerning the interaction effect of the intervention (teacher facilitation and computer

activities versus computer activities alone) and disability status on the social behaviors of the children. It was predicted that the children with disabilities and without disabilities would have more effective and less ineffective social behaviors in the teacher facilitated computer activity while children with and without disabilities in the computer only activity would have less effective and more ineffective social behaviors as measured by the SIOS. There are eight effective behavior categories on the SIOS: child engages in positive interaction with peers, child engages in parallel play, child engages in associative and/or cooperative play, child engages in positive linguistic interaction, peer initiates interaction towards child, child responds positively to peer, child initiates interaction towards peer, and peer responds positively to child's initiation. The SIOS also measures seven ineffective behaviors: child directs negative behaviors to the peer, child engages in nonplay behavior, child engages in solitary play, child responds negatively to peer, child makes no response to peer, peer responds negatively to child, and peer makes no response.

Observer A and Observer B used the SIOS to record the occurrence of the 15 effective and ineffective social interaction behaviors during four, one-minute observations for the 24 intervention sessions for each child in the study. No significant difference was found in the 15 social interaction behaviors between the children with and without disabilities. These findings indicate that children with and without disabilities demonstrated the same number of effective and ineffective social interaction behaviors in this study regardless of their disability status.

This finding conflicts with other studies in which children with disabilities were found to exhibit less effective peer social interactions compared to typically developing

children (Evans et al., 1992; Guralnick, & Groom, 1988). There are a few possible explanations for the children with disabilities performing at an equal level with their peers in this study. Unlike other studies that grouped unfamiliar children together (Guralnick & Groom, 1988; Guralnick et al., 1995), this study grouped children together who knew each other and who were peers in the same educational environment. The children were familiar and comfortable with their teachers, the physical surrounding, the routine, and the social climate of the class. In short, the children in this study had the opportunity to learn and practice social skills in a natural environment.

In addition, the children were paired into dyads in this study rather than large play groups of children as in other studies (Butz, 1999; Hyatt, 2000). The dyad arrangement of children probably was more conducive to reciprocal communication and other social exchanges between the two children. Also, it has been suggested that highly structured activities are more effective in impacting the social competence of children with disabilities (DeKlyen & Odom, 1989). This study involved a computer activity that was structured in an open-ended manner. The children always met at the computer center and engaged with the same software and peer. This provided continuity and predictability to the intervention even though the activity the children decided to do may have differed from session to session.

As predicted, all the children in the teacher facilitated computer intervention group had significantly more effective social interaction behaviors than the children in the computer only intervention group. This difference existed for all of the effective social interaction behaviors except for parallel play. Parallel play occurred at the highest frequency of all the SIOS behaviors for both intervention groups. This result occurred

because the children were seated next to each other during the computer activity and even if they were not socially engaged, their proximity still constituted parallel play as defined by the SIOS.

According to the SIOS results, all the children in the teacher facilitated group showed more social interactions, linguistic interactions, child and peer initiations, child and peer responses, and associative and/or cooperative play. This finding supports the efficacy of teacher facilitation to develop social skills in young children and is consistent with the findings of LeBlanc & Matson (1995) who found that children with disabilities gained social interaction behaviors when instructed on specific social behaviors. However, the findings are not consistent with other research concerned with the use of teacher facilitation in the area of social skills instruction (Butz, 1999; Hyatt, 2000). This may be due to the length of the intervention. The social skill training conducted by LeBlanc & Matson (1995) took place over a six-week time period whereas the intervention provided in the Butz (1999) and Hyatt (2000) studies were four weeks and eight days in length respectively. The children in this current study participated in the intervention for six-to-ten weeks depending on the number of extra sessions needed to compensate for absences. It may be that social skill instruction, regardless of the intervention, should occur over a long period of time to be effective.

Another factor that might have contributed to the success of the teacher facilitated intervention was that the facilitation was provided by two special education teachers with Masters degrees. Both teachers were highly skilled. Other studies in this area used preschool teachers and teacher assistants (Butz, 1999; Hyatt, 2000).

In addition, the teacher facilitation in this study occurred in the context of a computer center with dyads of children rather than in a large area with play groups of five-to-eight children. Previous research has indicated that children with and without disabilities show a higher level of social play and socially directed behaviors during computer activities compared to other play activities (McCormick, 1987; Spiegel-McGill et al., 1989). This may be due to the structured nature of the computer activity. In follow up interviews, the teacher facilitators indicated that the physical boundaries of the computer center and having only two children participate in the computer activity at one time made the teacher facilitation intervention a more focused activity in which the children were totally involved.

In this study, the teacher facilitation was directed at the child with the disability and at the typically developing child. Therefore, the teacher facilitator used child specific and peer mediated social intervention within the context of the computer activity. During the course of every intervention session, it was the teacher's choice to prompt the child with the disability or the child without the disability to socially initiate or respond. Prompts directed at the child without the disability were considered to be a peer mediation intervention that has been shown in the literature to be a powerful social intervention (Odom et al., 1986; Storey et al., 1992; Odom et al., 1999). Within the computer intervention only group, there were some incidences in which the children without disabilities helped or socially initiated to the children with disabilities spontaneously without any prompts from the teacher. However, in the teacher facilitated group, the models and prompts offered by the teachers resulted in a greater frequency of assistance offered and social initiations by the children without disabilities.

In summary, the efficacy demonstrated by the teacher facilitation during computer activities may have been due to a number of factors. The length of the intervention, skill of the teacher facilitators, structure of the computer center, two-child group, and the peer mediated instructional component may have influenced the effectiveness of the intervention.

Two ineffective social interaction behaviors were found to be significantly different between the two intervention groups. They were the SIOS behaviors of child makes no response and peer makes no response. Unlike what was predicted in this study, the teacher facilitated computer group had a higher frequency of these ineffective behaviors. An explanation for this finding may be that the no responses were related to the higher number of child and peer initiations in the teacher facilitated group. The children with and without disabilities were attempting to initiate positive interactions, join in the computer play activity, give instructions, or modify a computer play activity more frequently than the children in the computer only intervention. Subsequently, the child receiving these initiations may have had less time to respond and may have felt less inclined to respond immediately. It may be that the high rate of child interactions in the teacher facilitated intervention led to a situation in which a child could not respond to everything and so, at times, simply had no response or forgot to respond.

Positive and Negative Interactions of Younger and Older Preschool-Aged Children During Computer Activities Versus Teacher Facilitated Computer Activities

Question four dealt with the positive and negative social interactions of the children as measured by the Observer Manual concerning the interaction effect of the

intervention (teacher facilitation and computer activities versus computer activities only) and the chronological age of the children (older preschool children and younger preschool children) on social interactions. It was predicted that the older and younger preschool-aged children would have more positive and less negative interactions in the teacher facilitated computer group while the older and younger preschool-aged children in the computer only group would have less positive and more negative interactions. In addition, it was predicted that the older children would have more positive and less negative interactions than the younger children.

As predicted, the second statistical analysis conducted on the Observer Manual data using intervention group assignment and chronological age of the children as independent variables indicated that there were more positive interactions between the children with and without disabilities in the teacher facilitation computer activity compared to the computer only activity. The teachers, using facilitation strategies, were successful in increasing the number of positive interactions of all the children regardless of age.

Previous research on the social play of children indicated that children become increasingly more social and sophisticated in their social play as they become older (Parten, 1932; Howes & Matheson, 1992). Unlike what was predicted, there were no differences in the positive interactions for the younger children compared to the older children based on the data collected with the Observer Manual. The SIOS, which is a more sensitive measure of the social behaviors of the children, did indicate that the older children had more positive social interactions than the younger children.

Research indicates that as toddlers and preschoolers become older, they become less aggressive and have fewer difficulties with peers (Howes & Matheson, 1992). However, in this study there were no significant differences in the negative interactions between the older and younger children. This was also true for the teacher facilitated and computer only groups. Negative interactions were far less frequent than positive interactions for both the younger and older preschool children in the teacher facilitated and the computer only intervention groups. Given the low number of negative interactions, it is possible that the teachers may not have had enough opportunities to address the already low frequency of negative interactions. It may be that the teachers simply focused their efforts on increasing the positive social interactions of the children.

Effective and Ineffective Social Behaviors of Younger and Older Preschool-Aged Children During Computer Activities Versus Teacher Facilitated Computer Activities

Question five dealt with the social interaction behaviors of the children as measured by the Social Interaction Observation Scale (SIOS) concerning the interaction effect of the intervention (teacher facilitation and computer activities versus computer only activities) and the chronological age of the children (older preschool children and younger preschool children) on the social behaviors exhibited. It was predicted that the older and younger children would have more effective and less ineffective social behaviors in the teacher facilitated computer group while the older and younger children in the computer only group would have less effective and more ineffective social behaviors as measured by the SIOS. In addition, it was predicted that the older children

would have more effective and less ineffective social behaviors than the younger children.

Based on Vygotsky's theory (1935/1978), the social skills of children are enhanced by interactions with more skilled peers and adults. Therefore, it was expected that the children in the teacher facilitated group would have more effective social interactions than the children in the computer activity alone. The data from the SIOS indicated that the children in the teacher facilitated computer group exhibited significantly more effective social interaction behaviors than did the children in the computer only activity. The children in the teacher facilitated group had more effective social interaction behaviors, with the exception of parallel play, compared to the children in the computer only activity. However, the children in the teacher facilitated computer group also exhibited more child and peer no responses. Again, this may be due to the high number of social initiations that were occurring between the child with the disability and the typical peer. There was simply so much going on in the session that neither child could respond to every social bid.

According to Vygotsky (1935/1978), the teacher should guide learning through demonstrations and verbal prompts and customize teaching efforts to each child's zone of proximal development. In this study, the teacher facilitation provided prompts to build upon the existing social interactions of the children in the dyad. The teachers prompted the children with disabilities and their peers without disabilities to socially initiate and respond within the context of sharing, play organizing, agreeing, helping, and persisting during the computer activity. It appears that the teacher facilitation coupled with the

motivating computer activity was highly effective in promoting social interactions in this study.

In a longitudinal study, Howes & Matheson (1992) demonstrated that the social play of young children follows a predictable sequence and that children, as they age, become less aggressive and more prosocial with their peers. Therefore, it was expected that the older children in the study would have more effective social interaction behaviors than the younger children in the study. As predicted, the older children had significantly more social interaction behaviors as measured by the SIOS than did the younger children. The one exception was in the social interaction area of parallel play. All of the children in this study sat next to each other at the computer center during the intervention; therefore their immediate proximity and engagement in the same activity without any other social exchanges constituted parallel play. Unlike the predicted outcome, the older children had significantly more child and peer no responses during the social exchanges than did the younger children. An explanation for this may be that the older children had more social initiations throughout their time at the computer center leading to more no responses. The older children may have chosen to not respond or simply did not have enough time to respond to all of the initiations. In addition, there were no differences between the younger and older children in other ineffective behaviors (e.g., negative behaviors, negative responses, nonplay behaviors, and solitary play). Ineffective behaviors occurred at a far less frequency than the effective social behaviors. This finding is consistent with the Howes and Matheson (1992) findings that young children become more prosocial with their peers as they grow older.

In summary, the preschool teachers believed that the children with disabilities improved their social skills more than the children without disabilities regardless of their intervention group assignment. All of the children in the study had few negative social interactions regardless of age, disability status, or intervention group assignment. The children with and without disabilities in the teacher facilitated computer activity engaged in more positive social interactions and demonstrated more effective social behaviors than the children in the computer only activity. And, finally, there was no difference in the frequency of positive social interactions between the younger and older children as measured by the Observer Manual, however the older children had more effective social interaction behaviors than did the younger children as measured by the SIOS.

Interview with the Teacher Facilitators

Question six dealt with the perceptions of special education teacher facilitators regarding the use of computer activities and teacher facilitation to improve the social skills of young children with and without disabilities. The qualitative data gathered from the interviews conducted prior to the study and immediately following the study provided this information. The domain and componential analyses organized the teacher interviews into cultural domains. A cultural domain has been defined as a category of cultural meaning that includes other smaller categories (Spradley, 1980). The special education teachers provided their insights as to their reasons for believing that the teacher facilitation was effective, the unique aspects of the computer activities that optimized the social interactions between peers with and without disabilities, and the experiences of the children as they developed social skills and friendships.

Teacher Facilitation

During the pre-interview, the teachers stated that they believed teacher facilitation probably was going to be helpful in the promotion of child interactions, modeling appropriate social behaviors, and assisting with conflicts between the children. However, in the post-interview the teachers elaborated in detail regarding the advantages and disadvantages of teacher facilitation. The teachers indicated surprise at the additional social benefits provided by the teacher facilitation during computer activities. They noted that the strategy was especially helpful for the children with limited verbal skills. It is possible that for these children the extra assistance from the teacher allowed them to perform within their zone of proximal development. On the other hand, the teachers also observed that the no teacher facilitation condition was conducive to peer social interaction between the children with and without disabilities who had adequate verbal skills. Some of these children developed friendships as a result of the close proximity and structured activity that occurred during the computer only intervention.

The special education teachers also indicated the belief that the teacher facilitation intervention was important for children without disabilities. The children without disabilities in the teacher facilitated group increased their tolerance with and patience for the children with disabilities. Over time, the children without disabilities learned to read the idiosyncratic social cues from the children with disabilities and their interactions became more effective. The teachers also believed that the children without disabilities in the no facilitation group were less patient with and tolerant of the children with disabilities. These perceptions were consistent with the existing literature indicating that without social skill intervention, children without disabilities often perceive children with

disabilities as not belonging in their class (Schnorr, 1990) and thus the children without disabilities do not correctly read the social initiations of the children with disabilities (Hanline, 1993). In addition, both teachers stated that the children with and without disabilities in the teacher facilitation group developed more friendships than in the no teacher facilitation group.

There were some potential disadvantages to teacher facilitation identified as well by the teachers. The special education teachers reported that the teacher facilitation was an intensive intervention requiring time, close proximity, and appropriate teaching skills. Odom et al. (1999) found that the more intense a social intervention the more difficult it was to implement effectively and the more likely the outcome to be poor. This concern of the teachers should be considered in relation to the research indicating social skills interventions must be ongoing in inclusive settings (Guralnick, 1999). If teachers perceive an intervention to be too time intensive, they may not use it regardless of its benefit. Teachers have identified limited teacher time to be a major barrier to implementing intervention strategies for promoting social interactions skills of young children (Odom et al., 1993).

Before the intervention started, the teachers were initially concerned with intervening more than necessary and therefore stifling natural peer interactions. DeKlyen & Odom (1989) suggest that frequent teacher interaction with students may actually interfere with peer interaction. During the study, the teachers realized that the prompting procedure required them to wait for a 30-second period of no interaction before providing any prompts. The programmed time-delay controlled for excessive teacher intervention

in this study. In addition, the teachers stated that they needed to be cognizant about fading prompts and allowing the children to interact on their own.

Computer Activities used to Facilitate Social Interaction

The two special education teachers identified more advantages related to using computer activities to facilitate social interaction after the intervention phase. They both indicated their surprise at the number of advantages of using computer activities for social interaction facilitation. The teachers in this study noted that the computer center had distinct physical boundaries with a computer screen and two chairs that helped the students focus rather than wander (physically and cognitively). They also believed that limitation of two children at the center maximized the opportunities for social interaction between the two children. These comments are similar to the findings of McCormick (1987) and Howard et al. (1996) who found that the computer had learning characteristics that differed from typical preschool activities in that it was highly motivating, structured, and interactive.

Consistent with the research conducted by Perlmutter & Behrend (1985), the computer centers in this study were consistently popular centers for the preschool students. The new software used exclusively during the course of the study was a novelty factor in the classroom. In the opinion of the teachers, the opportunity to engage in computer activities with the children with disabilities made the children more attractive as a playmate to some of the children without disabilities. This is consistent with the research conducted by Hall (1994) who identified specific toys or activities as necessary components to develop friendships.

The teachers also maintained that the computer activities offered some unique attributes that made it easier for the children with disabilities to participate in social interactions with peers. These beliefs are supported by the work of Spiegel & McGill et al. (1989) who suggest that the high reactivity of the computer compensates for the skill deficits of the children with disabilities when they play with the children with disabilities. The software activities provide a high level of visual, auditory, and cause and effect feedback compared to other typical preschool activities. In addition, the software program used for this study was an art program that allowed children to work on basic concepts such as colors, counting, shapes, and position. The special education teachers indicated that some of the children, experiencing difficulties with basic concepts, learned them readily from the software program.

Both teachers spoke to the fact that a few of the children with disabilities never freely selected the computer center prior to this study. They indicated that at the conclusion of the study all of the children with disabilities were comfortable at the computer center. This finding was corroborated by some of the parents of the children with disabilities who noticed a new confidence and skill level in their children and began to talk to the teachers about purchasing home computers for their children.

The special education teachers also believed that there were some disadvantages to the computer center as a tool to facilitate social interaction. The teachers said that the training they were provided in the use of the prompting procedure and in the use of the software program was imperative to their ability to work with the children effectively. They felt that any teacher attempting to facilitate social interaction at the computer center must have the basic computer skills as well as knowledge and access to specific software

programs. They also stated that a teacher must know the software programs conducive to decision making, turn taking, and creating products to be truly effective social facilitators. Odom et al. (1999) indicated that the expectations put upon teachers during a comprehensive social skill intervention may prove to be overwhelming which reinforces the need for appropriate teacher training.

Social Experiences of the Children

An overriding theme expressed by both of the special education teachers focused on the friendships among the children with and without disabilities that developed as a result of the study. Over time, all of the children showed more effective social interactions during the computer activities and these social interactions generalized to other activities throughout the school day. The two teachers indicated that they and other teaching staff in the classrooms observed new affiliations between children that were not present prior to the study. During the course of the study and after the conclusion of the study, the children with and without disabilities exhibited new behaviors and affect associated with friendships. For example, Charles was extremely verbal and popular, but he rarely interacted with the children with disabilities in his class. During the computer activities, he grew increasingly more patient with Houston, a child with a disability. He learned to negotiate with a peer who was less verbal than himself and make joint decisions with him.

One of the four preschool teachers, who was initially opposed to the study and the new computer center, reported to one of the teacher facilitators that she noticed the children with and without disabilities in her class were laughing and verbalizing with each other at the computer center. Two children from her class, who were in the

computer activity alone group (Intesar and Mary), generalized their new association beyond their time at the computer by walking hand-in-hand to another center after their computer time. In addition, Eddie asked the teacher facilitator about Adam's special diet and communication board during the teacher facilitated computer intervention. The teacher facilitators concluded that both of the interventions provided time together and, therefore, were conducive to promoting friendships of children. Buysee (1993) identified time spent together as an important factor for friendship development.

One teacher discussed the change in social patterns she saw among the children who participated in the study. She spoke about Darien, a child with a disability, who learned to use the computer proficiently with the help of the teacher and Devin, a child without a disability. Devin laughed when Darien tried to make the characters move on the screen by maneuvering the mouse saying, "Come on people". After the study, Darien was invited to Devin's house for a play date for the first time.

Conclusions

Eleven conclusions may be drawn from this study. They are based on the quantitative and qualitative data that were collected.

1. The preschool teachers perceived that the children with disabilities were improving their social skills more than children without disabilities in both the teacher facilitated computer intervention and the computer only intervention. Three of the students with disabilities substantially improved their social skills as measured by the Teacher Impression Scales.

2. The teacher facilitated computer intervention was more effective than the computer intervention alone at increasing the positive social interactions of the children with and without disabilities as measured by the Observer Manual.

3. The children in the teacher facilitated computer intervention and the computer only intervention had no significant difference in the number of negative interactions as measured by the Observer Manual. The negative interactions were far less frequent than the positive interactions for all of the children in this study.

4. The children with and without disabilities did not differ in the number of positive or negative interactions as measured by the Observer Manual. Disability status did not impact the type of interactions between the children.

5. The teacher facilitated computer intervention was more effective than the computer only intervention in increasing seven of the effective social interaction behaviors measured by the Social Interaction Observation System. These were positive interaction, associative and/or cooperative play, positive linguistic interaction, peer initiates interaction, child responds positively, child initiates interaction, and peer responds positively.

6. The children in the teacher facilitated computer intervention exhibited two of the ineffective social interaction behaviors measured by the Social Interaction Observation System more frequently than the children in the computer intervention alone. These were child makes no response and peer makes no response. These no responses were related to the high number of social initiations. Overall, the number of ineffective social interaction behaviors exhibited by all of the children were far less than the effective social interaction behaviors exhibited by them.

7. Younger and older preschool-aged children did not differ in the number of positive or negative social interactions as measured by the Observer Manual. Chronological age did not impact the type of interactions between the children.

8. The older children who participated in this study exhibited more of seven of the effective social interaction behaviors as measured by the Social Interaction Observation System than did the younger children. These were positive interaction, associative and/or cooperative play, positive linguistic interaction, peer initiates interaction, child responds positively, child initiates interaction, and peer responds positively.

9. The older children who participated in this study exhibited more frequently two ineffective social interaction behaviors than the younger children as measured by the Social Interaction Observation System. These ineffective social interaction behaviors were child makes no response and peer makes no response. These no responses were related to the high number of initiations made by the older children.

10. The special education teachers perceived that the computer center and software activities provided an effective context for facilitating social interaction.

11. The special education teachers perceived that all of the children who participated in the study benefited socially from the study, but that the children in the teacher facilitated computer intervention gained more behaviors necessary for social competence and friendships.

Recommendations for Further Study

Past research indicates that children with disabilities do not socially interact as often or as successfully as children without disabilities (Guralnick et al., 1995; Hall, 1994). The majority of this research has been conducted in self-contained environments or contrived environments in which children are brought into an unfamiliar environment for study. Research is just beginning to focus on social skill instruction in the inclusive educational setting. Current research is comparing the efficacy of different social skill interventions in this natural environment. This research is important in light of the fact that children with disabilities increasingly are educated in the natural environment. Based on the results of this study, the following areas are suggested for further study.

1. Further qualitative research is needed to examine the perceptions of the children. Interviews with children regarding teaching facilitation and computer activities may provide a fuller explanation regarding the advantages and disadvantages of an intervention of this type.

2. A variation of this study should be conducted using a computer activity versus other center activities to provide information regarding the specific attributes of the computer activity that are more or less conducive to peer interaction.

3. A longitudinal study similar to this study would provide information regarding the long-term generalization of the social skills and computer skills achieved over time, in different settings, with different children, and with different teachers.

4. Because it is recognized that open-ended software programs are age appropriate for young children, a study that makes use of a variety of open-ended

software programs to teach social skills to children is needed. This study should specifically address the attributes of the software.

5. A study using a variety of facilitators needs to be conducted. Because teaching assistants and parents are often used in the early childhood classroom for supervision and teaching purposes, it is important to investigate the type of training necessary for them to learn and use facilitation to prompt and socially engage children.

6. While the older children in this study showed more social interaction behaviors than the younger children, both age groups were responsive to the teacher facilitation. More research is needed to evaluate the influence of social skills interventions on younger preschoolers. This should involve methods to modify these interventions to maximize the early learning of appropriate social skills for these younger children.

7. Many preschool students with physical disabilities cannot manipulate typical preschool toys, but can use the computer with special seating and adaptive equipment for access. More studies are needed to evaluate the impact of computer activities and adaptive equipment on the social competence of these children.

8. Future studies concerning social skill training in the inclusive classrooms should include a larger sample of diverse participants. The studies should seek to include children with different diagnoses and from diverse ethnic backgrounds.

9. Both special education teachers indicated that teacher training was imperative to their use of facilitation and the technology in this study. Further research that evaluates the current skill level of teachers related to social skill intervention and technology in early childhood programs is necessary.

Summary

Inclusion emerged as a major service alternative for young children in the 1990s and has become a mainstay in the field of early childhood education (Odom, 2000). Research on the impact of social competence intervention in the inclusive preschool setting is relatively new, as is the use of technology in early childhood education.

The role of the teacher during computer activities designed to facilitate social interactions among children in inclusive classrooms was addressed in this study. The results of this study appear to indicate that computer activities coupled with teacher facilitation contributes to effective social interactions between children with and without disabilities in the inclusive classroom. This study supports previous research that indicated children with disabilities benefit from social skill intervention involving teacher facilitation and peer mediated instruction, children without disabilities need assistance reading the cues of children with disabilities, and children do socially interact and help each other at the computer center (Hanline, 1993; LeBlanc & Matson, 1995; McCormick, 1987; Odom et al., 1986).

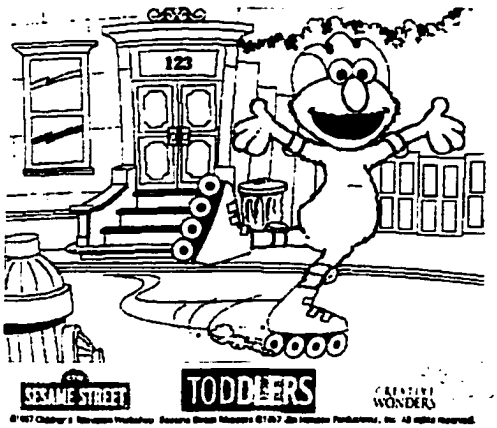
Because the focus on inclusion efforts must provide teaching strategies that work (Bricker, 2000), further research is needed to elaborate on the successful intervention demonstrated in this study. The goal of an inclusive environment is social integration that is characterized by children with and without disabilities learning from one another, making friends with one another, and providing role models for one another. The ability to socially interact in a positive manner impacts all of these goals. Because children with disabilities must achieve a level of social performance that is comparable to the children

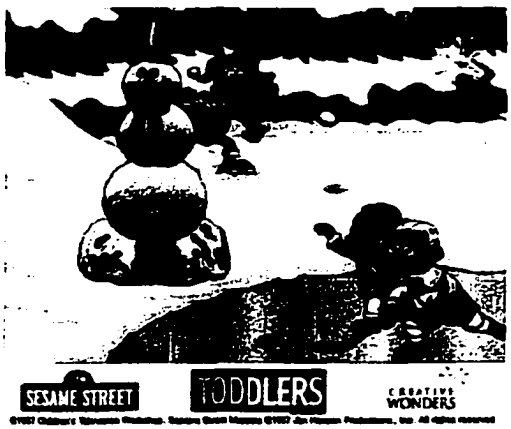
without disabilities (Guralnick, 1999), it is imperative that research concerning social skill teaching strategies for the inclusive preschool continues.

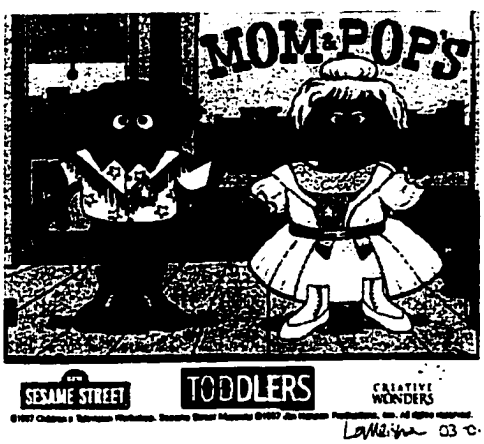
APPENDIX A

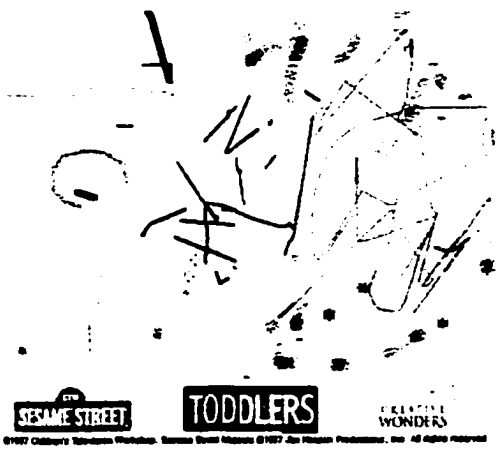
ELMO'S ART WORKSHOP

Children's Work on Elmo's Art Workshop Software









APPENDIX B

TEACHER FACILITATION BASED ON PLAY TIME/SOCIAL TIME

Teacher Facilitation based on *Play Time/Social Time* (Odom & McConnell, 1997)

Six Social Interaction Skills	Verbal Prompts during Computer activity
1. Sharing-offering toys or material to initiate social interaction	1a. "____, ask ____, 'Do you want to color?'" 1b. "____, pass the mouse to ____."
2. Requesting to share-asking peer for toys to initiate play and interaction	2a. "____, ask ____ for the mouse." 2b. "____, tell ____ that you want to paint."
3. Play organizing-suggesting specific activities or themes to peer for play and interaction	3a. "____, tell ____ how to dress Elmo." 3b. "____, say, ' You paint the picture blue.'"
4. Agreeing-agreeing with peer or offering positive responses to social initiation from others	4a. ____, put Big Bird on the screen with ____." 4b. ____, choose an activity with ____."
5. Helping-giving or requesting assistance to peer	5a. ____, help ____ make a birthday card." 5b. ____, ask ____ to help you put the hat on Burt."
6. Persistence-maintaining efforts to initiate social interaction	6a. "Look at ____ and ask again for a turn". 6b. "____, point to the screen and ask for a sticker".

Prompting Procedures. Complete prompting procedures in the following five steps. Always use the least intrusive prompt necessary to achieve the interaction.

1. **Observe children.** Sit behind them at the computer station. Watch for periods of noninteraction, times when the children are not interacting. When no interaction has occurred for 30 seconds, it is time to prompt.
2. **Provide a specific prompt to the target child or peer to begin interaction or respond to an initiation.** Say the child's name, and prompt the child to attempt an initiation/response with the peer.
3. **Observe the child for compliance with your prompt.** Be sure to give the child sufficient time (at least 10 seconds) to comply with the prompt. Make your best judgment about whether the child is likely to attempt the behavior prompted. If the child does not begin the social skill, provide a second more specific prompt. Say the child's name, repeat the previous prompt in a more specific manner or give a similar one appropriate at the moment. This prompt should be about a specific social interaction skill.
4. **Observe the child for compliance with the second prompt.** If the child does not begin to comply in 10 seconds, repeat the prompt once and provide physical guidance. This physical prompt may include turning the child to face a peer, moving the child's hand to the mouse, or physically guiding the child to pass the mouse.

5. **Observe the child for compliance with your specific prompt and physical guidance.** If the child does not comply, redirect the child to a new portion of the activity and provide a new general prompt. The purpose of this prompting sequence is not to increase compliance, but rather to promote social interaction.

(Adapted from *Play Time/Social Time* by Samuel Odom & Scott McConnell, 1997)

APPENDIX C

PARENT CONSENT FORM

Parental Consent Form

Dear _____

Cynthia Lau, a doctoral student in the Department of Special Education will be conducting a research project at the UNLV/CSUN Preschool located on UNLV's campus.

The purpose of the study is to investigate the potential effectiveness of computer use on the social skills of children. All the participants will be taught how to use the computer program Elmo's Art Workshop. The children will be videotaped while they play at the computer center with the software program. Some of the children will receive adult assistance in interacting with their peers while they play at the computer. The children's social skills and social interactions will be assessed before, during, and after the study.

Anticipated benefits will be to validate the use of computers as an effective method to increase social interactions among children. Since this study involves naturalistic observation using the videos of the children in the preschool setting, there is minimal risk to the children from participation (physical, psychological, social or legal). To ensure confidentiality, names and any other identifying information will not be used in any reports generated from this research. There will be no compensation for participation in this study because all activities and observations will take place during the normal course of the child's day at the UNLV/CSUN preschool. Participation is voluntarily and children may withdraw at any time.

Please check and initial one of the following:

_____ I herby authorize Cynthia Lau to observe and videotape my child and allow her access to my child's portfolio and other files contained within the preschool for the purpose of conducting research at the UNLV/CSUN Preschool. Further, I understand that my child's first name and information such as age, number of siblings, and other non-identifying information will be provided to the investigator because she has a legitimate need to know for educational and related purposes, such as research.

_____ I do not wish my child to participate in the study described at this time.

By signing this form, I am acknowledging my understanding of this study and I agree to allow my child, _____ to participate.

Signature of parent or guardian_____ Date _____

Thank You, Cynthia Lau

For further information about this study, please contact:

Dr. Kyle Higgins

Department of Special Education

University of Nevada, Las Vegas

Las Vegas, NV 89154

(702) 895-3205

For information of Rights of Research Subjects, please contact:

Office of Sponsored Programs (702) 895-1357

APPENDIX D

TEACHER CONSENT FORM

Teacher Consent Form

Dear _____

Cynthia Lau, a doctoral student in the Department of Special Education will be conducting a research project at the UNLV/CSUN Preschool located on UNLV's campus.

The purpose of the study is to investigate the potential effectiveness of computer use and teacher facilitation on the social skills of children. All the participants will be taught how to use the computer program Elmo's Art Workshop. The children will be videotaped while they play at the computer center with the software program. Some of the children will receive adult assistance in interacting with their peers while they play at the computer. The children's social skills and social interactions will be assessed before, during, and after the study.

Anticipated benefits will be to validate the use of computers as an effective method to increase social interactions among children. Since this study involves naturalistic observation using the videos of classroom interaction in the preschool setting, there is minimal risk to you from participation (physical, psychological, social or legal). To ensure confidentiality, names and any other identifying information will not be used in any reports generated from this research. There will be no compensation for participation in this study because all activities and observations will take place during the normal course of your day at the UNLV/CSUN preschool. Participation is voluntarily and you may withdraw at any time.

Please check and initial one of the following:

_____ I herby authorize Cynthia Lau to observe and videotape me for the purpose of the research project.

_____ I do not wish to participate in the study described at this time.

Signature of teacher _____ Date _____

Thank You, Cynthia Lau

For further information about this study, please contact:
Dr. Kyle Higgins
Department of Special Education
University of Nevada, Las Vegas
Las Vegas, NV 89154
(702) 895-3205

For information of Rights of Research Subjects, please contact:
Office of Sponsored Programs (702) 895-1357

APPENDIX E

PERMISSION LETTER FOR THE TIS

Permission to Use Copyrighted Material

University of Nevada, Las Vegas

I, Samuel Odom, Ph.D.

holder of copyrighted material entitled Play time/Social time

authored Samuel Odom, Ph.D. and Scott McConnell, Ph.D.

and originally published in Play time/Social time: Organizing you classroom to build interaction skills by the Vanderbilt-Minnesota Social Interaction Project

hereby give permission for the author to use the above described material in total or in part for inclusion in a doctoral dissertation at the University if Nevada, Las Vegas.

I also agree that the author may execute the standard contract with University Microfilms, Inc. for microform reproduction of the completed dissertation, including the material to which I hold copyright.

Signature Date

Samuel Odom, Ph.D.

Name (typed) Title

Indiana University

Representing

APPENDIX F

TEACHER IMPRESSION SCALES (TIS)

Teacher Impression Scales (TIS)

by

Scott McConnell & Sam Odom (1993)

Child Name _____ Date _____

Teacher _____ Subject Number _____

Please read each item below and rate the degree to which it describes the child's behavior in your classroom program. *If you have not seen the Child perform a particular skill or behavior, circle* **1**, *indicating* **Never**. If the child frequently performs the described skill or behavior, circle **5**, indicating **Frequently**. If the child performs this behavior in between these two extremes, circle **2, 3,** or **4** indicating your best estimate of the rate of occurrence of the skill.

1 = Never Performs Skill **5 = Frequently Performs Skill**

Circle only one number for each skill. Do not mark between numbers.

1 ... 2 ... 3 ... 4 ... 5	1. The child converses appropriately.
1 ... 2 ... 3 ... 4 ... 5	2. The child takes turns when playing.
1 ... 2 ... 3 ... 4 ... 5	3. The child plays cooperatively.
1 ... 2 ... 3 ... 4 ... 5	4. The child varies social behavior appropriately.
1 ... 2 ... 3 ... 4 ... 5	5. The child is persistent at social attempts.
1 ... 2 ... 3 ... 4 ... 5	6. The child spontaneously responds to peers.
1 ... 2 ... 3 ... 4 ... 5	7. The child appears to have fun.
1 ... 2 ... 3 ... 4 ... 5	8. Peers interacting with the child appear to have fun.
1 ... 2 ... 3 ... 4 ... 5	9. The child continues an interaction once it has begun.
1 ... 2 ... 3 ... 4 ... 5	10. Peers seek out the child for social play.

1 ... 2 ... 3 ... 4 ... 5	11. **The child uses appropriate social behavior to begin an interaction.**
1 ... 2 ... 3 ... 4 ... 5	12. **The child enters play activities without disrupting the group.**
1 ... 2 ... 3 ... 4 ... 5	13. **The child suggests new play ideas for a play group.**
1 ... 2 ... 3 ... 4 ... 5	14. **The child smiles appropriately at peers during play.**
1 ... 2 ... 3 ... 4 ... 5	15. **The child shares play materials with peers.**
1 ... 2 ... 3 ... 4 ... 5	16. **The child engages in play activities where social interaction might occur.**

APPENDIX G

PERMISSION LETTER

FOR THE SOCIAL INTERACTION OBSERVATION SYSTEM

Permission to Use Copyrighted Material

University of Nevada, Las Vegas

I, Kathryn Kreimeyer, Ph. D.

holder of copyrighted material entitled Social Interaction Observation System, 1990-1991

authored by Kathryn Kreimeyer, Ph. D. , Shirin Antia, Ph. D., Lisa Coyner, M. S., Nancy Eldredge, Ph.D. and Abha Gupta, M.A.

and originally published in Social Interaction Observation System, Project Interaction, University of Arizona, 1990-1991

hereby give permission for the author to use the above described material in total or in part for inclusion in a doctoral dissertation at the University if Nevada, Las Vegas.

I also agree that the author may execute the standard contract with University Microfilms, Inc. for microform reproduction of the completed dissertation, including the material to which I hold copyright.

Signature Date

Shirin Antia, Ph. D.

Name (typed) Title

University of Arizona

Representing

APPENDIX H

SOCIAL INTERACTION OBSERVATION SYSTEM

Social Interaction Observation System

(Kreimeyer, Antia, Coyner, Eldredge, Gupta, 1991)

The purpose of the Social Interaction Observation System (SIOS) is to provide descriptive information on the social behaviors of hearing-impaired children during their interactions with peers. Observations conducted with the SIOS should occur during a free play period of at least 10 minutes. It is important to observe children during free play periods as these are times when teacher direction is minimal and children can choose who they will play with and what they will do.

The SIOS is based on an interval observation system; a child is observed for a specified interval and then all of the listed behaviors that occurred during that interval are recorded. The SIOS obtains data for an individual child over four one-minute intervals during one observation session. We ask that a total of three separate observations, each providing four minutes of data on an individual child, be conducted. Each observation should be conducted approximately one to two weeks apart.

OBSERVATION PROCEDURES:

1. Before each observation, complete SECTION IDENTIFYING INFORMATION of this form and the read through the balance of the form to familiarize yourself with the behaviors you will be asked to score and the descriptive information you will be asked to provide.
2. Locate the child whom you will observe, begin the audiotape which will cue you as the end of each on minute interval, and observe the child continuously for the full one minute period.

3. When the audiotape indicates that one minute has elapsed, stop the tape recorder, and complete the TIME 1 column of SECTION B, OBSERVATIONAL DATA. Read each behavior and record a (+) if the behavior was observed during the one minute interval and a (0) if it was not observed. It is extremely important that you score each of the 15 behaviors.
4. After you have scored each behavior, start the audiotape and begin observing the child when the tape indicated that the second minute interval has begun. Observe continuously for the second minute. When the audiotape indicates that the second minute has elapsed, stop the tape recorder, and complete the TIME 2 column of Section B. Repeat this process for the third and fourth minutes.

Complete section A before beginning the observation.

SECTION A. IDENTIFYING INFORMATION

Observer_____ School _____

Child_____ Date_____

First name Last name

Observations # 1 2 3 (circle one)

Time begin_____ Time end_____

Complete Section B after completing Section A.

Read each behavior and record a (+) if the behavior occurred during the observational interval and a (0) if it did not occur.

Section B. OBERVATIONAL DATA

	Time 1	Time 2	Time 3	Time 4
1. CHILD ENGAGES IN POSITIVE INTERACTIONS WITH PEERS (Playing or conversing with other children, physical signs of affection, engaging in interactive games).				
2. CHILD DIRECTS NEGATIVE BEHAVIORS TO PEER(S) (Hits, kicks, throws toys, bits, pushes, shouts, takes material to toys without permission, disrupts or interferes with play activity, uses negative sign or oral communication such as "no", "don't do that", "stop it", "dumb you", "I'm not your friend", "hate you", or displays negative inflection in gestures, voice or signs.)				

3. CHILD ENGAGES IN NONPLAY BEHAVOR (Watches peers, wanders, sits or stands, away from other children; does not engage in play behaviors; no social contact with peers.)				
4. CHILD ENGAGES IN SOLITARTY PLAY (plays along and with materials that are different from those of other children or plays alone and uses same materials as peers but in a very different manner; no social contact with peers while playing.)				
5. CHILD ENGAGES IN PARALLEL PLAY (Plays beside peers and engages in similar activities; social contact is only through gaze or imitation. Children do not interact with one another.)				
6. CHILD ENGAGES IN ASSOCIATIVE AND/OR COOPERATIVE PLAY (plays with peers(s) and communicates with them about the play activity (gestures, speech or sign); engages in a cooperative project (i.e. building a block castle); or engages in formal games or dramatic play.)				

7. CHILD ENGAGES IN POSITIVE LINGUSTIC INTEACTION (uses recognizable words or signs during interaction, does not include unintelligible vocalizations, gesture or listening/watching.)				
8. PEER(S) INITIATE INTERACTIONS TOWARDS CHILD (peer attempts to begin POSITIVE interactions with child; to join child when he/she is already engaged in play; to give instructions to child; or to modify the ongoing play activity. This item does not assess the appropriateness at these attempts.)				
9. CHILD RESPONDS POSITIVELY TO PEER INITIATIONS (When peer(s) attempt to POSITIVELY interact with the child, child responds by interacting positively with the peer OR by attempting to follow instructions given by peer(s).)				

10. CHILD RESPONDS NEGATIVELY TO PEER INITIATION (When peer(s) attempt to POSITIVELY interact with the child, child responds by overly refusing to interact with peer(s); by not allowing peer(s) to join the play; OR by directing negative behaviors toward peer(s).)				
11. CHILD MAKES NO RESPONSE TO PEER INITIATION (when peer(s) attempt to POSITIVELY interact with the child, child looks at the initiator but does not interact respond.				
12. CHILD INITIATES INTERACTION TOWARDS PEERS (Child attempts to begin POSITIVE interaction with peers; to join peer(s) already engaged in play to give instructions to peer(s); OR to modify the ongoing play activity. (This item does not assess the appropriateness of these attempts.)				

13. PEER(S) RESPOND POSITIVELY TO CHILD'S INITIATIONS (When child attempts to begin POSITIVE interaction, peer(s) respond by interacting with the child OR by attempting to follow instructions given by the child.				
14. PEER(S) RESPONDS NEGATIVELY TO CHILD'S INITIATIONS (When child attempts to begin POSITIVE interactions, peer(s) respond by overtly refusing to interact with the child; by not allowing the child to join the play; OR by directing negative behaviors toward the child.)				
15. PEERS MAKES NO RESPONSE TO CHILD'S INITIATION (When the child attempts to POSITIVELY interact with peer(s), peer(s) look at child but do not interact or respond.)				

APPENDIX I

PERMISSION LETTER FOR THE OBSERVER MANUAL

Permission to Use Copyrighted Material

University of Nevada, Las Vegas

I, Shirin Antia, Ph.D.

holder of copyrighted material entitled Observer Manual, 1989-1990

authored by Shirin Antia, Ph.D., Kathryn Kreimeyer, Ph. D. and Nancy Eldredge, Ph.D.

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hereby give permission for the author to use the above described material in total or in part for inclusion in a doctoral dissertation at the University if Nevada, Las Vegas.

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Shirin Antia, Ph.D.

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University of Arizona

Representing

APPENDIX J

OBSERVER MANUAL

Observer Manual

(Adapted from Observer Manual by Antia, Kreimeyer, & Eldredge, 1990)

Definitions

Interaction refers to conversations, cooperative play (which includes imitative games such as Follow the Leader), exchange of materials or physical contact between two or more persons. If two persons are playing together with the same toy this is considered an interaction; e.g., passing a ball back and forth or sharing a blanket when playing house. The following are examples of interactions. The target child is Jay in all the following descriptions of interactions.

1. Jay says, " Carl, give me that balloon please."
2. Jay gives Rachel a piece of candy.
3. Jay is playing a game of cards with Noel and Rachel.
4. Jay hits Noel.
5. Jay snatches a toy from Susie.
6. Jay says, "Susie, would you play with me?"
7. Jay says, "Susie, I like your picture."
8. Jay says, "Everybody come here."
9. Jay puts out his hand and Rachel takes hold of it.

If two persons look at one another but are not involved in conversation, cooperative play, exchange of materials or physical contact, interaction is not coded. Similarly, if two persons are smiling, frowning, laughing or crying without engaging in any interactive behavior, interaction is not coded. Also, if one is talking to him/herself it is not coded as an interaction.

1. The following are some examples where interaction is not coded:
2. Jay watches Noel kick the ball.
3. Jay smiles at Noel.
4. Jay cries because he hurt his foot.
5. Jay and Susie paint pictures side by side.

Positive and Negative Interactions

Each interaction can be classified as positive or negative. Positive interaction includes normal conversation, including giving requests and polite refusals, sharing materials playing cooperatively, interactive games, cooperative play and physical signs of affection (e.g., hugging, holding hands). Negative interaction includes snatching materials or toys from a peer without asking and receiving permission, shouting, hitting, throwing, pulling or pushing away. (The child who is offended must indicate that the behavior of the initiating child is upsetting by crying, reaching for the toy, pushing, etc.).

Coding Rules

Only the target child's behavior is coded. Thus, if Rachel is talking to Jay (the target child) and Jay merely looks at her, no interaction is coded.

Only one interaction may be coded per interval. If more than one type of interaction occurs, code the interaction closest to the end of the interval.

If no interaction takes place during an interval make a diagonal slash (/) in the categories.

Data Recording Procedures

1. Use one data recording form for each child in the study.
2. You will observe the target child for five seconds and then record the observed behavior during the next five seconds. The data recording sheet has two columns

to record positive and negative interactions. Record a (+) if a positive or negative interaction occurred during the observational interval in the corresponding column and a (0) if no positive or negative interactions occurred.

3. Record a total of 24 intervals for each child.
4. In the last row record the total number of positive and negative interactions observed.

Observer Manual Data Recording Form

Name of Child _____

Dyad _____ **(Names of both children)**

Class _____ **(Hearts, Ladybugs, Butterflies, Rainbow)**

Date_____

Interval	Positive	Negative
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		
16		

17		
18		
19		
20		
21		
22		
23		
24		
Total		

APPENDIX K

CHECKLIST FOR TEACHER FACILITATION

Checklist for Teacher Facilitation

Teacher: _____

Classroom/Children: _____

Action	Trials				Notes
Begins computer software program prior to children's arrival.					
Arranges children in close proximity at the computer center in good sitting posture.					
Introduces computer activity.					
Verbally reminds children to play together.					
Demonstrates prompting of interactions in appropriate time intervals (within 30 seconds of no interaction).					

Prompts only one side of the interaction, the initiation or the response.					
Prompts are specific instructions related to social interaction (to share, request to share, to organize play, agree, help or persist).					
Demonstrates appropriate sequence of prompts (first verbal prompt, second verbal prompt, verbal prompt with physical guidance and redirect child to another activity.					

Provides minimum amount of prompting required to maintain social reciprocity during computer activity.					
Uses the software activities to facilitate common interest, turn taking, and ongoing interaction.					

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VITA

Graduate College
University of Nevada, Las Vegas

Cynthia Lau

Home Address:
2110 Donlon Court
Henderson, Las Vegas 89012

Degrees:

Bachelor of Arts, Psychology and Social Work, 1986
University of California, Berkeley

Master of Science, Occupational Therapy, 1992
San Jose State University

Publications:

"Comparison of Three Computer Interface Devices for Individuals with Severe Physical Disabilities" in the American Journal of Occupational Therapy (November, 1993)

"Chronic Pain in the Child with Spinal Cord Injury", chapter for the book The Child with a Spinal Cord Injury (1994)

"Comparison Study of QuickCast Versus a Traditional Thermoplastic in the Fabrication of a Resting Hand Splint" in the Journal of Hand Therapy (January-March, 1998)

"Using Computer Activities to Facilitate Social Interaction of Young Children with Physical Disabilities" in Teaching Exceptional Children (1999)

Dissertation Title: The Use of Teacher Facilitation During Computer Activities to Improve the Social Interaction of Preschool Children in Inclusive Classrooms

Dissertation Examination Committee:
Chairperson, Dr. Kyle Higgins, Ph.D.
Committee Member, Dr. Jeff Gelfer, Ph.D.
Committee Member, Dr. Susan Miller, Ph.D.
Graduate Faculty Representative, Dr. Eunsook Hong, Ph.D.