

Computer Availability and Use by Young Children in Childcare Settings

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Technology integration into the early childhood environment provides learning opportunities that promote self-directed learning and interaction with peers for young children with disabilities. This study reports the results and implications of a survey of 132 inclusive childcare settings on the availability of computers in childcare settings, children's use of computers, and the types of software available to young children. Findings of interest include (a) a relationship between childcare cost and access to computers, (b) a finding that childcare settings are less likely to have software for play, and (c) designated computer centers were found to be lacking. Implications for teacher training are discussed.

More children than ever before are being cared for in childcare settings, both in large center-based childcare settings and in-home childcare settings. An estimated 13 million children under the age of six spend their day in non-parental care (Children's Defense Fund, 2000). As enrollment continues to increase, childcare providers must be equipped to accommodate children with disabilities and have knowledge about best practices that foster positive development for this specific group of children (Martin, 2000).

The integration of instructor-centered as well as learner-centered technology use for children with disabilities is well represented in reviews of literature (Blackhurst & Edyburn, 2000; Edyburn, 2001, 2003; Hains, Belland, Conceicao-Runlee, Santos, & Rothenberg, 2000). In a study of childcare settings and public school preschool classes of children with disabilities, Martin, Seevers, and Crawford (2002) investigated a seeming disparity between the availability and types of computer use reported anecdotally by families of children with disabilities. Families of young children with disabilities had reported the lack of technology in their child's preschool special education classroom and the availability of technology in the child's after-school childcare program. Results of this exploratory study supported the parents' anecdotal reports and found that the inclusive childcare settings offered more and varied types of computer use for children aged 3-5 years than did the preschool special education classes for children aged 3-5 years in elementary school settings. In a look at technology and the learner environment in 200 childcare settings, Martin, Crawford, and Seevers (2003) found that only 60% ($n = 121$) of the centers surveyed reported having computers available for children to use. Additionally only 34% ($n = 69$) of the childcare settings had computer learning centers or a technology learning center for children to use.

The Division for Early Childhood of the Council for Exceptional Children, in its compilation of recommended practices for early childhood environments, suggested that technology applications as well as the social environment provide learning opportunities and activities that promote self-directed learning and interaction with peers (Smith et al., 2002). However, the actual availability of computers necessary to provide a technologically enhanced learning environment for young children with disabilities is suspect. Based on the recommended best practices and the increasing enrollment of children with disabilities in childcare centers, this study investigated the availability and implementation of technology within childcare settings, with specific emphasis on inclusive childcare centers.

The Integration of Technology

The implementation of technology in preschool programs has the capacity to benefit all children, particularly children with disabilities. Although computers are used to adapt activities, the integration of computer play can increase social interactions between children with and without disabilities (Hobbs, Bruch, Sanko, & Astolfi, 2001; Lau, 2000; Spiegel-McGill, Zipiroli, & Mistrett, 1989). When children use technology collaboratively,

higher levels of communication and cooperation are used than when they use computers independently (National Association for the Education of Young Children [NAEYC], 1999). In a study that investigated the impact of cooperative computer activities on the social interactions between children with and without disabilities, parent interviews yielded the following perceived benefits: (a) making friends; (b) an increased sense of belonging; (c) learning cooperative skills; and, (d) socialization with students without disabilities (Hobbs et al.).

In addition to the aforementioned social benefits for children with disabilities, technology promotes other positive outcomes for all children such as creativity, problem solving, and writing skills. Furthermore, computer-generated products evoke excitement in young children (Davis & Shade, 1999), and the use of graphics in a computer-based approach might be more successful at sustaining a child's attention, with computer instruction proceeding at the child's pace (Schery & O'Connor, 1997).

Software. For technology to benefit young children, play software must be available. Computers should be available in designated areas that are easily accessible within the classroom learning environment, thus enabling young children to choose computer activities during unrestricted and nondesignated, self-determined learning time. In addition, play software that requires open-ended responses by the child requires higher cognitive reasoning, whereas teacher organized play is defined as "nonplay" (Yelland, 1999).

Despite the recommendations by NAEYC (1999) that young children with disabilities need opportunities to implement technology for play, the majority of early childhood special education teachers report that technology is implemented primarily to support basic skills drill and practice (Judge, 2001). Merely providing drill and practice software, however, does not signify proper integration of technology (Davis & Shade, 1999). In the study by Judge, 93% of the teachers reported that they employed computers with young children, yet many teachers reported that they had not received adequate training to support the proper integration of technology, and some teachers did not believe that there was sufficient developmentally appropriate software available for young children. Furthermore, Judge acknowledged that only 45% of early childhood special education teachers believed that computer use increased social interaction; this may be in response to the teachers' primary use of computers as vehicles intended for drill and practice of basic knowledge and skills. This is in direct contrast with NAEYC's position that technology can "...enhance children's cognitive and social abilities" (1999, p. 282).

Hobbs et al. (2001) demonstrated that both structured and unstructured computer play activities yielded positive results for preschool children with disabilities. In both unstructured and structured environments, children with disabilities actively interacted with nondisabled peers. The Hobbs et al. study indicated that after the implementation of both structured and unstructured computer play activities, all children were more likely to choose computer activities during free play periods, and the frequency of inclusive play (children with and without disabilities playing together) increased over time. Thus, children learned to interact with peers during computer activities, and the interactions generalized to nonstructured free time. Therefore, the benefits of technology on the development of young children appear to be related to the way that technology is implemented within the classroom learning environment (play vs. drill and practice).

Child-directed activities. NAEYC (1999) recommends that technology be appropriately and successfully integrated into the classroom environment where children can use it regularly. For optimal benefit, young children must have a choice regarding when and how much time they spend at the computer. Technology and choice help young children gain competence and autonomy, and is especially important for children with disabilities (Parette, Hourcade & Heiple, 2000). As stated by NAEYC (1999), "Efforts should be made to ensure access to appropriate technology for children with special needs, for whom assistive technologies may be essential for successful inclusion" (p. 283).

Social Competence and Play

In early childhood, friendships are first established through mutual interests, as children interact with others (Hartup, 1992). In addition, when children collaborate with friends, information is transmitted from one person to another, which fosters mastery of specific tasks. Such interactions provide opportunities for conflict resolution, which enables children to develop social skills. Free play activities provide opportunities for greater peer interaction, enabling young children to express their feelings (Pavri, 2001).

To be socially competent is to successfully carry out an interaction so that it is both effective and appropriate (Guralnick, 1992). In addressing the needs of children who lack social competence and to make changes in the social competence of children with and without disabilities, social strategies must be addressed within the context of social tasks (Guralnick, 1990, p. 4; 1992, 1992).

Children with disabilities are more likely to be socially incompetent and to experience loneliness than other children, partially due to difficulties in recognizing and processing social cues (Pavri, 2001). A potential solution to the problem of isolation or rejection and one that facilitates successful learning and frequent social interaction is to provide opportunities to practice socially competent behaviors within the context of classroom group activities (Harriott & Martin, 2003). By ensuring that "social/communicative skills are integrated, organized, and sequenced during the course of a social task" (Guralnick, 1992, p. 49), the teacher provides the opportunity for social strategies to be addressed. Embedding this opportunity into specific grouping strategies for activities at the computer promotes friendships and community, provides the necessary social context, and takes into account the characteristics of peers (Clements, 1999; Haugland & Wright, 1997; Lau, 2000).

This follow up study was thus undertaken to further investigate children's use of computers in childcare centers. In particular, this study addressed the prevalence of computers available to children in child care centers, the types of software that are available to children, as well as how the children use computers within the learning environment. An additional goal was to examine whether there was a relationship between the cost of attending the childcare center and the availability of computers. A final purpose was to determine the extent to which childcare centers report that they do or do not admit children with disabilities.

METHOD

Sample

Using the yellow pages of a metropolitan phone book, 200 childcare settings were randomly selected from the "Child Care Centers" listings. Of the 200 centers asked to participate, 143 of the childcare settings responded to the surveys. The final sample represented childcare centers located throughout the greater Houston metropolitan area.

Instrument

An expanded survey based on one previously used (Martin, Seevers, & Crawford, 2002) was created for the purpose of this study. The survey consisted of demographic information (including whether or not they accept

children with disabilities), a question concerning the weekly and monthly cost of enrollment, along with eight questions designed to assess the availability of computers in childcare settings, children's use of computers, and the types of software available to young children. The eight questions were categorical, with most questions requiring a forced choice of a yes or no answer. Although no reliability and validity data are available, the questions were generated for this study and appear to have high face validity.

Procedures

From the advertisements listed in the yellow pages of the large metropolitan area phone book, 200 child care centers were randomly selected to participate. A graduate research assistant telephoned the directors of the child care centers, with 143 child care centers completing the phone survey. This is a return rate of 71.5%; 57 (28% of the 200 centers contacted) failed or were unable to report all survey information and were excluded from the pool. Only those childcare centers that reported all requested information ($N=143$) were included in this study. Responses to the survey questions were recorded in writing by the graduate research assistant.

Data Analysis

To assess the prevalence of children's access to computers at childcare centers, frequencies and percentages were calculated. In addition, frequencies and percentages were calculated to examine the ways in which students used computers (i.e., with adults, peers or independently), the types of software that were available to children, as well as whether or not the centers accepted children with disabilities.

A Pearson Product Moment Correlation examined whether there was a relationship between the weekly cost of enrollment at childcare centers and children's access to computers at the centers.

RESULTS

The results of this study indicated that out of the 143 childcare centers that completed the survey, 92.3% ($n = 132$) of the childcare centers accepted children with disabilities. The data reported below pertain only to the 132 inclusive childcare centers.

Among the inclusive daycare centers, 60.6% ($n = 80$) reported that they had computers available for children to use. Among those centers that provided computers for children to use, several findings emerged. First, only 23% of the childcare settings had specific areas designated as “computer centers.” In addition, the majority of the centers that had computers for children (70.4%) reported that the software available to children was primarily used for learning, such as for drill and practice of skills. The centers were far less likely (33.3%) to have software available for play.

In addition to the types of technology available to students, frequencies and percentages were also used to determine the ways in which the children at child care centers used the computers. Results indicated similar rates in the ways in which children used computers (86% of the centers stated that computer use was sometimes assisted by adults; 86% similarly stated that children had computer experiences in which peers assisted; 86% also reported that children had opportunities to use computers independently). However, regardless of whether or not children used computers alone or with assistance, 50% of the centers reported that adults directed the types of computer activities.

Finally, the Pearson Product Moment Correlation indicated that there was a relationship between the weekly cost of enrollment at child care centers and children’s access to computers ($r(137) = .25, p < .01$). Weekly costs for enrolling a three-to-four year old child ranged from \$65.00 to \$212.00, with an average weekly cost of \$114.28.

DISCUSSION

Integration of Technology

Previous discussions have addressed the importance of the integration of technology into early childhood environments (Crawford & Bell, 2001; 2002). The current study investigated computer use and availability in inclusive childcare settings for young children. Prior research has highlighted the positive impact of technology on the social skills, self-esteem, and development of problem-solving skills in young children. Although many of the childcare centers (60.6%) in the current study had computers available for young children to use, not all children who attended the surveyed child care centers had access to computers. Unfortunately, a relationship was found between cost of child care and availability of computers for children to use, suggesting inequitable computer access for children attending child care centers.

Although no relationship is implied, several possibilities for the lack of technology integration in child care centers are relevant. Considering that the results of this study demonstrate a relationship between cost of care and availability of computers, integration of technology may be related to cost and maintenance issues. However, of import are the possibilities related to personnel preparation. First, childcare directors may not be aware of the benefits of a technologically supportive environment for all children. Another possibility is that early childhood teachers in the child care centers do not have the training and skills to effectively integrate technology into the child care classroom. Additionally, early childhood teachers may not know or understand the various educational benefits for young children, with and without disabilities, that the integration of technology may contribute to a supportive learning environment.

Software. Results of this study suggest that even when computers were available for young children in child care centers, the implementation of the computers contrasted with the NAEYC's (1999) recommendations, as well as recommendations by Yelland (1999), for the proper integration of technology, which stated that play software must be available for young children. Findings from the current study, however, demonstrated that of the child care centers that had computers available for children to use, few (33.3%) offered play software, whereas many of the childcare centers (70.4%) offered software primarily for drill and practice of basic skills. These results support previous research that software is more often used for drill and practice than for play (Judge, 2001). Haugland (1992) reported that drill and practice software employed only 45 minutes a week by young children results in significant losses in the area of creativity. In a later discussion, Haugland (1999) presented recommendations for software for young children and a method of evaluating appropriateness for young children. Additionally, several options are described for using peripherals, software, websites, and additional technologies with young children allowing them to explore concepts (Yost, 2002). An additional finding of concern from this study was the lack of specific designated computer areas for children to use, thus precluding children from choosing computer activities during free time.

Several possible explanations exist related to the lack of technology centers or software for play in child care settings. Although the issue may be a physical space or financial one for some child care centers, it is likely that childcare directors and/or early childhood teachers lack the training and expertise to design and set up a technology center as well as the skills needed to evaluate and select developmentally appropriate software for play.

Child-Directed Activities

Findings of the current study indicated adult directed activities often occur in relation to computer use. That is, for approximately half of the time that young children accessed computers, adults were directing the activity. Software that is well designed and accessible promotes active exploration and interaction, provides immediate feedback for responses, reinforces when appropriate, and often provides good modeling as well as child controlled pace (Lonigan et al., 2003). Although the role of adult interaction is important for the development of young children, to enhance social benefits for young children with disabilities, cooperative use of technology with peers is recommended. However, the present research demonstrated that young children frequently used computers independently. This independent use of computers may be related to the software availability, that is drill and practice software. Without an understanding of the varied benefits of technology use for young children, early childhood teachers may not realize that child directed activities may also be used. Yost (2001, 2002) offered a variety of approaches and activities that teachers can use to provide opportunities for child-directed activities and computers. By providing a variety of opportunities across the day for child-directed computer use, children learn to use the computer as a tool.

Social Competence and Play

The emphasis on adult directed activity at computers, as indicated in this study, suggests that children were engaged in “nonplay” (Yelland, 1999) rather than the child-directed activity of play. Computer activities with peers provide opportunities for language and greater interaction such as speaking and pretend play. An apparent lack of technology centers seems to imply that computer play may not be a choice during free play. Furthermore, the emphasis on drill and practice type software may contribute to the perception that computers are not for spontaneous play. Indeed, this approach does not support the use of computers as a tool. With computers children can play traditional board games, design stories and settings, and engage in emotional involvement with others (Yelland) thereby promoting the integration and assimilation of language, feelings, thought, and action. One possibility for the lack of play-related technology is that the early childhood teachers do not view the computer as a tool to be used cooperatively by groups of children for play. Moreover, their own lack of experience with play and technology may be a contributing factor.

Children cannot seem to resist migrating to computers. The opportunities for friendships, conflict resolution, taking turns, paying attention, following instructions, and collaborating with others exist in cooperative computer activities that enable children to develop social skills. Computers can be a context for greater peer interaction, enabling young children to express their feelings and to demonstrate peer related social skills. Computers may be considered as a context for peer interaction to prepare young children for social skills "at work, at school, in the neighborhood, in child care, and in fact everywhere" (Strain & Smith, 1996, p. 25). Viewing cooperative computer activities as a context for peer interaction, in both current and future environments, provides support for addressing social competence, play, and child directed utilization of technology in early childhood settings.

The findings in the current study reveal that educators in childcare settings need training in the provision of developmentally appropriate use of technology for preschool children. As Darling-Hammond, Chung, and Frelow (2002) demonstrated, teachers who received their education in a high quality teacher education program had higher efficacy in instructional design, lesson delivery, classroom management, and understanding the diverse needs of learners. However, the study by Darling-Hammond et al. also demonstrated that all teachers, regardless of the type of preparation program they completed, felt a low level of efficacy regarding the application of technology in the classroom. Therefore, teacher training programs are neither introducing nor adequately preparing educators to implement various types of developmentally appropriate technology in learning.

Past research (Darling-Hammond et al., 2002; Forsbach-Rothman & Margolin, 2003) questioned the focus of the No Child Left Behind Act and challenged the U.S. Department of Education's (2002) statement that education coursework is not what creates a highly qualified teacher. The study by Forsbach-Rothman and Margolin found a correlation between the quality of methods courses and teacher efficacy. In addition, teachers across a variety of teacher preparation programs do not feel efficacious about their abilities to use educational technology (Darling-Hammond et al.). Therefore, this study supports past research, which states that quality of teacher preparation coursework is important for effective teaching. Without adequate training, early childhood teachers in child care settings will continue to inadequately deliver technology, thereby failing to foster positive developmental growth, particularly for children with disabilities who can benefit substantially from cooperative computer activities.

CONCLUSION

Technology integration into child care centers has increased over the past decade. Although professionals recognize the need to provide developmentally appropriate software for young children, the availability and use of technology lags behind the research findings on the benefits of using collaborative, child-directed computer play activities. In addition, the provision of technology across a variety of child care centers indicates that young children do not receive equitable access to technology. Further research is warranted to investigate the range of technology implementation and the factors that impact whether or not child care centers use developmentally appropriate approaches to the integration of technology.

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