RESEARCH-TO-PRACTICE SUMMARY

Classroom Computers and Social Interaction among Low-Income Preschool Children

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Despite increases in computer availability in the classroom, very little data exists on computer availability and its use in Head Start classrooms. Therefore, the purpose of this study was to examine the impact of availability of computers on urban preschoolers' naturally occurring social interactions in Head Start classrooms across one school year. The sample consisted of 66, predominantly African American, lower income preschool children in four urban, Head Start classrooms. A design was employed in which three classrooms had computers, while one classroom served as the comparison group. Naturally occurring social interactions were observed during free-play sessions over an 8-month period. Differences in social interactions across classrooms and school year were analyzed. Results suggest that classroom computer availability may increase the interactive behavior of preschoolers. Implications of study findings for use of computer centers in the preschool classroom are discussed.

Keywords: computers, social interaction, preschool children

Advancement of educational technology over the past two decades has resulted in government policy to increase computers in the classroom (McMillan Culp, Honey, & Mandinach, 2003). Children now get an early start on becoming technologically literate (e.g., No Child Left Behind Act, 2001; NAEYC, 2012) and computers are increasingly being integrated into young children's classrooms. Despite this increase, there is a substantial disparity in access to and functionality of technology between different socio economic statuses (SES) (Judge, Pucket, and Bell, 2006).

Regardless of SES, Caucasian parents are more likely than African American or Latino parents to have Internet access (Calvert, Rideout, Woodlard, Barr, & Strouse, 2005) and kindergarteners from minority families are less likely to attend schools that provide students with Internet access (Parsad & Jones, 2005; Rathbun, West, & Hausken, 2003).

Even though there have been general increases in computer availability in the classroom, very little data exists on computer availability and its use in Head Start classrooms (Bewick, 2000). According to Bewick (2000), the majority of Head Start teachers in one state reported that they had computers available for use with children. However, 17% said they didn't use them at all with the students and the majority (68%) had only one computer for a classroom of 16-20. Furthermore, lack of incorporation of the computers into the curriculum, inadequate equipment, and some concern over the appropriateness of use with young children was noted. Therefore, the purpose of this study was to examine the impact of availability of computers on urban preschoolers' social interactions in the Head Start classroom across one school year. The following review examines the issues related to computers and social interactions that have arisen over the past few decades. We aim to provide a new direction and shift the old debate.

Are Computers Developmentally Appropriate Materials?

The major debate in the 1990's was whether computers were developmentally appropriate for young children (Clements & Nastasi, 1993; Cordes & Miller, 2000; Haugland & Wright, 1997; NAEYC, 1996; Shade & Watson, 1990) and if so, could young children operate the computers (Borgh & Dickson, 1986; King & Alloway, 1992). To resolve this debate, computer proponents have provided empirical evidence that computers, when used appropriately and interactively, have the potential to transform conventional material for children, making it easier to organize and access information (Freeman & Somerindyke, 2001) and can benefit children's cognitive and social development (NAEYC, 2012). However, some educators have cautioned that assumptions about children's cognitive development cannot be made based on children's proficiency in manipulating computer icons (e.g., Elkind, 1996). Furthermore, a limitation of this line of research is that most of the studies available involve small sample sizes, usually of only one or two preschool classrooms.

Do Computers Cause Social Isolation in children?

The second issue in the 1980's was a concern that computers in the classroom would cause children to be isolated from their peers and deprive them of socialization (Baker, 1985; Barnes & Hill, 1983; Lipinski, Nida, Shade, & Watson, 1986). This notion of "social interaction deprivation" by computer has not been supported in the research literature. Typically, children use computers in dyads or groups in classroom settings (e.g., Clements, 1994; Swigger & Swigger, 1984). Hence a plethora of social interactions are reported. For example, Heft and Swaminathan's (2002) reported preschoolers observing and acknowledging each other; commenting, sharing and helping each other on the computer; as well as peer conflicts regarding turn-taking and sharing of the computers. However, no known studies have used a design in which they compare the social interactions of classrooms with and without computers.

How Does Computer Activity Compare to Other Activity?

A third issue was to compare the social interactions when working on a computer to social interactions when playing with other objects. Some researchers suggest that young children show increased pro-social behaviors when working together on a computer compared to other classroom activities such as toy-focused play (Lipinski et al., 1986; McCormick, 1987; Svensson, 2000). Muller and Perlmutter (1985) found that preschoolers spent significantly less time engaging in peer interactions while at puzzle play (7%) than they did while at computer play (63%). Additionally, only 11% of the time was spent in solitary activity at the computer, while 55% of the time was spent in solitary activity with the puzzle. Anderson (2000) found that 4-year-old's cooperative play in the computer center paralleled the proportion of cooperative play in the block center. However, one limitation of this research is that most of these studies had predominantly middle class and European-American children, and not low-income, urban, and/or minority children where computer access disparities exist (Calvert et al., 2005; NCES, 2003).

Do Computers Displace Important Activities?

A fourth issue is whether computer activity displaces other important developmental activities. Hohmann (1994) argues that for preschoolers and kindergarteners, the addition of computers to the environment has positive social consequences and appears not to disrupt other classroom social interactions. Lipinski et al. (1986) found that computer novelty initially interrupted free-play activity patterns by drawing children away from traditional activities. However, most activities returned to baseline levels within two weeks.

Given the above issues and limitations of past research, our goal was to open up a new line of investigation; to examine the impact of availability of computers on the social interactions of urban, low-income preschool children during indoor free play in classrooms. Based on the research reviewed above and other studies that have found positive effects of computers (e.g., Rhee, & Bhavnagri, 1991; Li & Atkins, 2004; Li, Atkins, & Stanton, 2006; Floyd, Canter, Jeffs, & Judge, 2008; Lonigan, Allan & Lerner, 2011; Diamond & Lee, 2011), we made the following conservative hypothesis: The availability of computers in the classrooms would not have a significant adverse impact on preschoolers' social interactions during indoor free play.

SUMMARY OF RESEARCH METHODS

The study sample consisted of 66 preschool children enrolled in a Head Start Program in a Midwest urban city. Children were recruited from four classrooms at three Head Start sites. The majority of children were African American and came from families with a low household income. Classrooms were randomly assigned to either receive a new computer center in the classroom or to a control condition that received the standard Head Start curriculum and learning center options. The computers were pre-installed with age-appropriate educational software programs (e.g., Millie's Math House and Bailey's Book House) and were set up near one another with chairs for two children per computer. Each child in a computer classroom had 15 minutes per day to play on the computer with their choice of available software.

Live observations of social interactions were conducted in the Head Start classrooms during each classroom's one hour free-play session. During free-play, the child could have been in the computer center or any other center in the classroom. Therefore, observations occurred across varied contexts. Observation sessions occurred twice a week, every other week for eight months, allowing for approximately 60 observations per child. All children's social interactions were recorded by trained observers using a coding system developed by Bhavnagri (1987). Observations included a primary code of social interaction, which varied from isolated/non-social behaviors, observing others, parallel play and positive and negative interactions. The child's verbal behavior, affect, and target of interaction were also recorded. Analyses of social interactions during free play and developmental trajectories of social interactions during free play across the school year based on classroom computer availability were conducted.

MAJOR FINDINGS

Overall, results showed that the presence of computers in the classroom did not have an adverse impact on preschoolers' social interactions. Children in classrooms with computers did not show lower amounts of interactive behavior across social, verbal or affect domains. On the contrary, the children in computer classrooms were more likely than children in classrooms without a computer to display socially interactive behaviors, to be verbal, and to display more affect. Children in the computer classroom condition were also more likely to interact with peers and less likely to play alone. Additionally, both computer and control classrooms displayed an increase in social interactions across the school year. This finding is fitting with developmental expectations for children of preschool age (Rubin & Krasnor, 1980; Smith, 1978).

There was some evidence that negative social, verbal, and affective interactions were more prevalent in the computer classroom. However, negative interactions were infrequent ($\leq$ 4%) and this difference may be a consequence of increased social interactions. Both positive interactions and negative ones are likely to increase across the school-year (Ramsey, 1995) and friends are likely to engage in more cooperation and conflict than non-friends (Hartup & Brett, 1987; Hartup, 1992). Because children are interacting with one another more frequently, it increases the chances of positive and negative behaviors. We do not interpret this as an indication that computer presence is harmful in light of the other findings.

Together, the results from this study suggest that the availability of computers in urban preschool classrooms may have a positive influence on children's social interactions. This conclusion is consistent with past studies that have found the interactions of children *on* the computer to be interactive and social in nature (e.g., Bergin et al., 1993; Muller & Perlmutter, 1985). However, the results from this study are not limited to on-computer activities, suggesting that the computer center may have a more general impact on classroom behavior.

IMPLICATIONS FOR PRACTICE

The primary implication of this study is that investing resources into a computer center in Head Start classroom can have a positive effect on social development. Results suggest that the positive effect may be carried over to off-computer interactions between children. Findings also add to the limited research that has been done on the effects of computers in Head Start

classrooms. Thus it expands our knowledge of potential benefits of the computer center in early childhood education. Computers may be a unique tool that fosters social learning. The presence of computers could alter children's views of self and alter behavior. Haugland (1992) found that the self-esteem of 4-year-old children in classrooms with computers was significantly higher than children without computers. Perhaps children view computers as "adult machines" and when allowed to explore them, they feel important, capable, and competent (Haugland, 1996).

Additionally, computers may offer an opportunity for children to engage in an activity that promotes child-child interactions. Research shows that children prefer to work on computers with peers (e.g., Swigger & Swigger, 1984). Perhaps social interactions on the computer promote the learning of pro-social behaviors, which carries over to other classroom activities. This hypothesis is consistent with Vygotsky's view on socially mediated learning (Vygotsky, 1978).

The NAEYC and Fred Rogers Centers highlight the importance of using technology and media appropriately in early childhood settings (2012). They emphasize that technology should be used for activities that are educationally sound and developmentally appropriate. They also highlight the importance of training and digital literacy for our early childhood educators. Consistent with these recommendations, we believe that the practical implications reported here could be further enhanced with greater teacher/adult involvement in the child's computer activity, greater integration of the computer into classroom curriculum, and computer training and assistance for teachers (Bewick & Kostelnik, 2004; Bergen, 2000, 2002; NAEYC, 2012; Plowman & Steven, 2005). It should also be noted that the American Academy of Pediatrics recommends discouraging screen exposure for children under age two and limiting the total amount of entertainment screen time for older children to one or two hours per day (AAP, 2013).

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