

## YOUNG CHILDREN, PARENTS, COMPUTERS, AND THE INTERNET

DEBORAH L. LINEBARGER

ARIEL R. CHERNIN

### ABSTRACT

*This small-scale exploratory study examined whether 74 very young (i.e., 48 year olds) children's and their parent's access to, use of, and perceptions regarding computers and the Internet were related to three traditional digital divide constructs: 1) family socioeconomic status (SES), 2) location of access to new technologies (i.e., both home and school access versus school access only), and 3) individual child characteristics (i.e., gender and age). It was found that while Internet access varied by family socioeconomic status (SES), Internet use varied by location of access to computers and the Internet. Parents' attitudes about computers and the Internet varied by location of access and family SES.*

*On the other hand, children's beliefs were mostly related to their gender or age. Interestingly, parents from low SES backgrounds were less comfortable with and less likely to view the computer and the Internet as educational tools, while their children were more likely than those children from working and middle SES backgrounds to choose the computer when they wanted to learn something new.*

---

Deborah L. Linebarger is an Assistant Professor at the Annenberg School for Communication at the University of Pennsylvania. [dlinebarger@asc.upenn.edu](mailto:dlinebarger@asc.upenn.edu).

Ariel R. Chernin is a Graduate Student at the Annenberg School for Communication at the University of Pennsylvania.

*Preparation of this manuscript was supported through a service agreement with Sesame Workshop which, in turn, was generously funded by Dell Computer Corporation. The authors are indebted to staff and students who helped to make this project successful. Among them are Nii Sai Doku, Allison Gilman-Caplovitz, Sanna Harjusola-Webb, Anjelika Kosanic, Jennifer Kotler, and Aparna Sampat. Thanks are also extended to the children and families from Kansas and New York who participated in this endeavor.*

Although the United States is one of the most wired nations in the world, there is still a large disparity between the Internet *haves* and *have-nots*. The importance of access to computers and the Internet has been underscored in numerous studies. Most recent large-scale survey research describes the digital divide in terms of access and use among children from differing income levels, ethnic and racial backgrounds, and gender (Roberts et al. 1999; Subrahmanyam and Greenfield 1999). Access and use information is important in describing trends in media penetration, and these recent trends support dramatic improvements in children's access and use for populations who have been lagging behind (e.g., poor families, African American and Hispanic families; Wilhelm, Carmen and Reynolds 2002; Corporation for Public Broadcasting (CPB) 2003). However, as this literature continues to evolve, other issues influencing children's and their families' abilities to use computers and successfully navigate the Web have moved to the fore. Researchers are now re-examining the digital divide through these different lenses.

For instance, some researchers describe the divide in terms of content available and appropriate for low income or racially diverse adults and children (The Children's Partnership 2000). Others discuss differences in usage patterns and content preferences for boy and girls (e.g., Kafai 1996). Attewell (2001) describes a "second digital divide," referring to disparities in the *quality* of computer use across racial and socioeconomic lines. While lower SES children's access to computers and the Internet at school has increased dramatically in recent years (CPB 2003), the quality of their access lags behind that of their middle and higher SES counterparts. Schools in lower SES neighborhoods typically offer limited access to high-speed Internet connections, fewer computers integrated into classrooms, and higher child-to-computer ratios (CPB 2003; Attewell 2001; Becker 2000). Becker (2000) also notes that, in general, higher SES children use school computers for more intellectually complex applications than lower SES children.

Another potent area for investigation involves describing children's and their parent's attitudes about or perceptions of computers and the Internet and whether these beliefs are moderated by these traditional digital divide constructs (e.g., family SES, location of access, individual child characteristics). Determining children's beliefs and the contexts surrounding their use of computers and the Internet may play an even greater role in helping to understand and bridge technological gaps. Television researchers, for example, demonstrated that children with more positive attitudes about television as an educational medium were able to learn and retain more messages from a program when compared to children who perceived television as an entertainment medium (Linebarger 2001; Salomon 1985). When learning from a medium where children either lack experience or do not perceive the medium as an educational or informational source, they may not work to process the material or information presented as deeply as they can.

Although not explicitly discussed by these researchers, inherent in this work is a focus on children as “actors in their own right” (Borgers, de Leeuw, and Hox 2000, p. 61). More specifically, understanding children’s opinions, attitudes and behaviors requires collecting this information directly from children rather than by proxy via parental report (Borgers et al. 2000; Scott 1997). Conducting research with very young children requires creativity and attention to their developmental ability in determining the most appropriate format for assessment. Most of the difficulty in working with young children is using techniques that let young children adequately and appropriately display what they know or believe about a particular content area in both reliable and valid ways (Pellegrini and Bjorklund 1998). Because of the challenges inherent in working with these very young children, little research addresses what they have access to or use; moreover, no research involves directly interviewing such young children about their perceptions of different media. Most recently, researchers have examined perceptions of media with older children (8-18 years old; e.g., Linebarger 2001; Livingstone and Bovill 2001; National School Board Foundation 2000).

Given the dearth of data with very young children, a small-scale, exploratory approach was developed to investigate these issues more fully and to provide a foundation for the development of a future research agenda. Therefore, the underlying purpose of this study was to understand in depth very young children’s beliefs (i.e., 4 to 8 years old) about media and whether these beliefs are related to 1) family SES, 2) location of access to new technologies and 3) individual child characteristics. Special research interest was devoted to whether parental attitudes shaped their children’s perceptions about computers and the Internet. This article presents only a subset of the data related specifically to children’s and parent’s perceptions of the computer and the Internet.

## **METHOD**

*Participants:* In total, 74 young children and their families participated in this evaluation. Parents were solicited through schools, libraries, and community centers located in lower-income neighborhoods in metropolitan Kansas City, Kansas (36 children), and New Rochelle, New York (38 children). As is typical with small-scale investigations, this sample was not selected to be representative of any larger population. Equal numbers of boys and girls from varied backgrounds ranging from low to middle socioeconomic status participated.

Socioeconomic status (SES) was coded into 3 groups based on education and income: incomes below \$30,000 and education of high school or less were coded lower SES; incomes between \$30,000 and \$65,000 and/or some college or trade school were coded as working class SES; incomes above \$65,000 and a college degree or higher were coded as middle SES. Table 1 contains a more

complete description of the major demographic characteristics of these parents and children, including normative data from large-scale nationally representative surveys for comparative purposes.

*Design:* These analyses are part of a larger descriptive study of parental and child perceptions of old media (i.e., TV, VCR, books, phone), new media (i.e., computers, the Internet, video games, Game Boy), and non-media activities (i.e., swings, balls, puzzles). Parents and children were extensively interviewed individually to ascertain their beliefs about these various activities (Linebarger 2002).

*Parent-Report Measures:* Parents completed a 20 minute questionnaire that included questions about demographics, media access and use, and attitudes toward media.

*Demographics.* Parents were asked to provide basic demographic information. Questions included in these analyses were child's gender, age, grade, parental education, income, family size, and employment.

*Media Access and Use:* Parents were asked to report the number of days per week and the number of minutes per day that their child used the computer and the Internet. They were also asked to report whether their child had these media present in their rooms, the number of these computers in other parts of the house, and whether they planned to purchase a new computer or obtain access to the Internet in the next 6 months.

*Attitudes about Media:* Parents' positive and negative beliefs about computers and the Internet were assessed through 10 items scored on a 5-point Likert Scale, anchored by strongly agree and strongly disagree (e.g., adapted from Turow 1999; Livingstone and Bovill 2001). Statements about the computer included whether the parent was comfortable using the computer, whether it was more important for their child to know about computers than it was for the parent, whether people were left behind if they didn't know about computers, whether schools should teach their child about computers, and whether the computer was more for entertainment than education. Statements about the Internet included 1) whether parents thought families were at a disadvantage if they did not have Internet access; 2) whether parents worried they would not be able to explore the Web as well as their children; 3) whether children who spent too much time online were isolated from others; and 4) whether access to the Internet helped their children with their homework.

**TABLE 1: MAJOR DEMOGRAPHIC CHARACTERISTICS OF THE SAMPLE**

<b>Attribute</b>	<b>Description</b>	<b>National Sample (%)<sup>i</sup></b>	<b>All (%) (n=)</b>	<b>Kansas (n=)</b>	<b>New York (n=)</b>
Total	Entire Sample	(n=)	(74)	(36)	(38)
Child Characteristics	Number of Boys	(n=)	(37)	(17)	(19)
	Number of Girls	10,356,467)	(37)	(20)	(18)
	Birth Order	(n= 9,865,969)	1.77	1.93	1.62
Race/Ethnic Group	African-American	12%	(16%) 12	(6)	(6)
	European-American	75%	(64%) 47	(28)	(19)
	Hispanic-American	13%	(7%) 5	(0)	5
	Native American	1%	(3%) 2	(0)	(2)
	Other/Not Reported	5.5%	(11%) 4/4	(2)	(6)
Demographics	Mom- Education	80.4% with HS diploma	13.8	12.9	14.7
	Dad- Education		14.2	13.7	14.8
	Income	\$50,000	\$62,000	\$49,000	\$75,000
	Number in Family	2.6	4.4	4.6	4.1
SES	Lower SES	33%	(19%) 14	(10)	(4)
	Working Class SES	39%	(54%) 40	(18)	(22)
	Middle SES	28%	(27%) 20	(8)	(12)

*Child Interview:* A 30–45 minute semi-structured interview was completed individually with each child in one of three locations: at the child's school, in the child's house, or at the local library in a location with few or no distractions (e.g., attractive toys, other children). Each child was led through a series of questions regarding his/her choice of activities (media and non-media) in a variety of situations using physical pictures and other materials to maintain child interest.

*User Imagery:* This section contained 20 cards: 10 images of children (gender-specific, with boy respondents viewing boy cards and girl respondents viewing girl cards), each card exhibiting various personality traits or emotions and 10 with different kinds of activities (7 media and 3 non-media). Children were asked to first identify which child they thought possessed a particular trait or exhibited a particular emotion (e.g., which child here do you think is smart?). Once the child made that choice, he/she was asked to "pick the one (activity) here that you think this smart child would want to do. Why did you pick that one (activity)?" Then the child was prompted again with "if the smart child could do one more thing, what would it be? Why?" Children's responses were recorded and coded as either computer (1) or non-computer (0).

Two measures of overall computer preference were created by summing the twenty dichotomous measures of computer choice (children made 2 media selections for each of the 10 personality traits or emotions). Because some of the traits and emotions presented to the children had positive connotations (i.e., smart, happy, popular, cool, and makes friends easily), while others had negative connotations (doesn't know a lot, lazy, lonely, mad, and frustrated), separate analyses were conducted for positive and negative traits.

*Favorite Activity:* Children were asked to report their favorite activity from the 10 media and non-media activities pictured. Responses were coded as either computer (1) or non-computer (0).

*Internet Drawing and Description:* Using art as an expression of underlying knowledge in a content area is one way to elicit young children's thoughts and feelings, especially when interpreted in conjunction with children's verbal descriptions of their work. Montasser, Cole, and Fuld (2002) explain that when children use multiple means of communication simultaneously, they are able to more fully express themselves. Other researchers have found that children asked to draw and describe an emotional experience (Gross and Hayne 1998) or a severe headache (Stafstrom, Rostasy, and Minster 2002) provided more than twice as much verbal information than children asked for verbal descriptions alone. In this study, children were given crayons and a piece of paper and were asked to draw a picture of "what you think the Internet is, or what the World Wide Web is." If the child was unsure or asked what it was, we directed them to do their best to draw the picture and that if they weren't sure that it was okay.

Once the children were finished drawing the picture, they were asked to describe the picture and label the different parts of their picture. These verbal explanations were recorded verbatim by the interviewer. Drawings and responses were coded into one of 3 categories: 0 = no knowledge of the Internet; 1 = knew that the Internet was related to using the computer; 2 = knew the Internet was related to the computer and had some function of communicating with others or had a global connectivity.

*Media "Learn From" or "Use When Bored":* Children were presented with the 7 media cards and asked 1) what they would use if they wanted to learn something new and why. After the child made a choice, a follow-up prompt of "Is there anything else here now that you could learn something new from? and 2) What would you want to do if there was nothing else to do and why?" For these analyses, the first response was coded as either computer (1) or non-computer (0).

*Analytic Approach:* Given the exploratory design of this research, results presented include simple descriptive statistics (i.e., mean, standard deviation,

percentages), chi-squares, and one-way analysis of variance (ANOVA). For dichotomous nominal variables, chi-square tests were used to evaluate differences. For continuous dependent variables (e.g., parental attitudes, computer preference), one-way ANOVAs were used to investigate group differences. Through these analyses, one is able to describe and test for the following: differences in parental attitudes and child access, use and attitudes by family SES and location of access to new technologies. Because of the developmental nature of work with young children, child's gender and age were included as potential moderators. The results are organized according to where relationships among constructs, parental attitudes, and child beliefs were found; that is, technology access and use and three different digital divide constructs: family SES, location of access, and individual child characteristics (i.e., gender and age).

## RESULTS

*Access:* Overall, Table 2 shows that 77% of the families reported having at least one computer in the home, and 85% of those families with computers (67% overall) also had an Internet connection. There were significant differences by SES level, with just 36% of families from the lowest SES category likely to own a computer, compared with 83% of working SES families and 95% of middle SES families,  $\chi^2 = 18$ ,  $p < .00$ . For those families who had computers, Internet access rates were lowest among families from low SES backgrounds at 40%, while 86% of working class families with computers had Internet access. All middle SES families with computers also reported Internet access,  $\chi^2 = 25$ ,  $p < .00$ . No differences were found by gender. Forty-three percent of low SES families reported they intended to purchase a computer in the next 6 months. Twelve children had computers in their bedrooms; however, there were no differences by age, gender, or family SES. Families with younger children were more likely to own a computer when compared with families with older children ( $\chi^2 = 4$ ,  $p < .05$ ).

*Use:* Despite differences in access by SES levels, Table 3 shows no significant differences in amount of use; that is, when families had a computer in the home, their children used it in similar amounts regardless of family SES. However, differences in use were found for location of computer and Internet use (which did differ by family SES). Those families who had computers at home obviously had children who spent more time using the computer. In addition, families with home Internet access also spent more time using the computer and going online. No usage differences were found by gender or age.

**TABLE 2: PERCENT OF CHILDREN WITH ACCESS TO MEDIA**

	<b>In-Home Computer Access</b>	<b>In-Home Internet Access</b>
% with Access	77%	67%
% National Access	69%	45%
Socioeconomic Status		
—Lower SES	36%	14%
—Working Class SES	83%	72%
—Middle SES	95%	95%
Gender		
—Boys	77%	69%
—Girls	77%	66%
Age		
4 to 5 year olds	89%	79%
6 to 8 year olds	69%	60%

*Parental Attitudes:* Table 4 shows that a majority of parents from middle SES backgrounds believed that 1) those who did not have Internet access were at a disadvantage; 2) going online too often leads a child to become isolated; and 3) access to the Internet can help their child with his/her homework. On the other hand, half of parents from low SES backgrounds believed that people worry too much about adults taking advantage of children online when compared with families from working or middle SES backgrounds. More of these parents also worried that they were not as good as their children at using the Internet than did parents of children from working and middle SES homes.

*Media Children Report Using for Learning:* Across the entire sample, 16 children (22%) chose the computer as their first choice for a “learning” medium. Table 4 analysis revealed that children from lower-SES families (43%) were significantly more likely than children from working class (25%) and middle-SES (0%) families to choose the computer as a learning activity.

*Parental Attitudes:* Table 5 shows that significant differences in attitudes about computers were related to the location where new technologies were used (see Table 5). Parents felt more comfortable using a computer if they owned one and more strongly agreed that people got left behind if they didn’t know about computers. Parents who did not have a computer at home more strongly believed that 1) it was important for their children to know about computers than it was for them to know about computers; 2) computers were

**TABLE 3: MEANS AND STANDARD DEVIATIONS FOR CHILDREN'S AVERAGE MINUTES PER WEEK OF MEDIA**

	<b>Computer Usage</b>	<b>Internet Usage</b>
<b>Overall Use (minutes)</b>	146	21
<b>National Sample</b>	205	8
<b>Computer Ownership</b>		
No	38 <sub>a</sub> (93)	11 <sub>b</sub> (35)
Yes	178 <sub>a</sub> (213)	24 <sub>b</sub> (55)
<b>In-home Internet Access</b>		
No	59 (103)	3 (13)
Yes	188 (223)	30 (59)
<b>Socioeconomic Status</b>		
Lower SES	100 (176)	13 (35)
Working Class SES	137 (137)	20 (52)
Middle SES	195 (286)	29 (54)
<b>Gender</b>		
Boys	168 (239)	16 (42)
Girls	123 (137)	26 (556)
<b>Age</b>		
4 to 5 year olds	191 (262)	30 (70)
6 to 8 year olds	117 (131)	15 (29)

*Note: National sample data taken from Roberts et al. (1999). Those values in columns sharing a subscript were significantly different at  $p < .00$*

more a source of entertainment than education; and 3) schools should teach their children how to use them.

*Children Attitudes:* Table 5 also shows that children without access to a computer at home (44%) were more likely than children with computer access at home (17%) to choose the computer as a learning activity. See Table 5.

*Parental Attitudes:* Table 6 shows that more parents of boys reported that people worry too much that adults will take advantage of children online compared with parents of girls.

**TABLE 4: DIGITAL DIVIDE CONSTRUCT 1: FAMILY SES**

<b>Parents' Beliefs</b>	<b>Family SES</b>			<b>C<sup>2</sup></b>
	<b>Low</b>	<b>Working</b>	<b>Middle</b>	
Child without Internet access at disadvantage	21%	35%	80%	3.9*
Parent worries won't be able to explore Web like my child	21%	18%	5%	5.0**
Going online a lot leads child to be isolated from others	14%	33%	30%	3.3*
People worry too much that adults take advantage of children online	50%	20%	30%	3.3*
Concerned that child might give out personal information online	14%	13%	15%	ns
Access to Internet helps my child with homework	7%	38%	65%	8.4**
Child chooses computer for learning	43%	25%	0%	9.5*
<i>Note: Percentage of parents who strongly/somewhat agree with each statement about computers or Internet and percentage of children who chose the computer for learning.</i>				
<i>*p &lt; .05; ** p &lt; .01; *** p &lt; .000; ns = non-significant.</i>				

**TABLE 5: DIGITAL DIVIDE CONSTRUCT 2: LOCATION OF CHILDREN'S ACCESS TO COMPUTERS**

<b>Parents' Beliefs</b>	<b>School Only</b>	<b>School and Home</b>	<b>C<sup>2</sup></b>
	Am comfortable using computer	69%	
More important for my child to know about computers than me	31%	17%	4.8*
Get left behind if don't know about computers	44%	61%	4.5*
School should teach my child about computers	75%	63%	4.4*
Computers and Internet are more for entertainment than education	38%	19%	4.9*
Computers are exciting	75%	83%	ns
<b>Child's Beliefs</b>			
Child chooses computer for learning	44%	17%	5.1*
<i>Note: Percentage of parents who strongly/somewhat agree with each statement about computers or Internet and percentage of children who chose the computer for learning.</i>			
<i>*p &lt; .05; ** p &lt; .01; *** p &lt; .000; ns = non-significant.</i>			

*Children's Preferences for New Technologies.* Table 6 shows that girls were more likely than boys to pick the computer when polled regarding what children exhibiting positive traits or emotions (i.e., smart, happy, cool, popular, makes friends easily) would prefer. For example, 46% of girls picked the computer for 2 or more of the 5 positive traits, while only 17% of boys picked the computer for 2 or more positive traits. There were no differences by family SES, location of access, and age. Similarly, for the negative traits (i.e., lazy, mad, frustrated, doesn't know a lot, lonely), no significant differences by gender, age, family SES or location of access were found.

*Children's Favorite Activity.* For the entire sample, some 9 children (12%) chose the computer as their favorite activity. Analysis revealed girls were significantly more likely than boys to choose the computer as their favorite activity; put another way, 8 of the 9 children in Table 6 who chose the computer as their favorite activity were girls.

*Internet Knowledge.* Based on the drawings and descriptions (see Table 6 and Figures 1a and 1b), 33 children (45%) had no knowledge of the Internet, 29 children (39%) knew that the Internet was associated with computers, and 12 children (16%) knew that the Internet involved computers and connectivity. Knowledge of the Internet did not differ significantly by gender. Instead, age was the only variable resulting in significant differences, with older children exhibiting greater knowledge of the Internet than younger children. Almost 30% of children 6 ½ years and older correctly represented and/or described the Internet, while only 5% of children younger than 6 ½ years knew what the Internet was.

*Activity Child Chooses When Bored.* Children's choices for an activity to do when bored were unrelated to gender or age.

## **DISCUSSION**

*Parental attitudes:* Parents' views of computers and the Internet revealed interesting and unexpected differences. Attitudes about the computer were mostly related to computer ownership, while attitudes about the Internet were related to family SES. Although ownership is related to family SES, families from a lower SES background with a computer expressed attitudes similar to others with computers regardless of family SES. Having a computer and Internet access at home was associated with more comfort with technology and a sense that other families and children would be 'left behind' if they did not

**TABLE 6: DIGITAL DIVIDE CONSTRUCT 3: INDIVIDUAL CHILD CHARACTERISTICS**

	Gender			Age		
	Boys	Girls	F/X <sup>2</sup>	Younger (4–6½ yo)	Older (6 ½–8 yo)	F/X <sup>2</sup>
<b>Parents' Beliefs</b>						
People worry too much that adults take advantage of children online	41%	16%	6.6*	22%	36%	ns
<b>Child's Beliefs</b>						
Positive Traits			17.8***			ns
None	44%	6%		26%	25%	
<b>Internet Knowledge</b>	19%	16%	ns	5%	29%	39***
<i>Note: Percentage of parents who strongly/somewhat agree with the statement about the Internet. Percentage of children in each category choosing the computer for positive traits and favorite activity. Percentage of children describing the Internet correctly. *p &lt; .05; ** p &lt; .01; *** p &lt; .000; ns = non-significant.</i>						

have one. On the other hand, when a family did not have a computer, the parents tended to report that it was more important for their child to know about computers than themselves and that computers were more for entertainment than education. In addition, these parents also more strongly agreed that schools should be teaching their children about computers.

These attitudes, including a discomfort with technology and a desire for a learning authority to take responsibility for their child's instruction in using it, reflect these parents' inexperience. They are not opposed to their children using the computer and they believe that a computer serves more of an entertainment purpose.

Thoughts about the Internet were more associated with a family's socioeconomic status. Parents from middle and working class backgrounds thought families without Internet access were at a disadvantage and that this access was helpful for their child's homework. On the other hand, families from a lower socioeconomic status background were less worried about their children being taken advantage of while online. Interestingly, these parents also worried that they would not be as able to explore the Internet as their children.

**FIGURE 1A: CHILDREN'S INTERNET DRAWINGS**

“...You play games, you look up stuff, check your messages that people send you. My brother knows; I don't know how. You can order pizza and look up movies, and it's a lot cheaper for pizza on the Internet.”

*--Boy, Age 6 years, 11 months*



The overwhelming majority of families without computers also were from low SES backgrounds. When examining computer and Internet attitudes as a whole, it appears that these families are ambivalent about the new technologies. They worry that they don't have the skills to navigate the Web and feel uncomfortable using the computer. Possibly because of this concern, they also more strongly believe that schools should take the lead in educating their children. However, they haven't fully embraced the technology and its importance in educating their children. They feel that these new technologies are more for entertaining and that their children are not at a disadvantage for not having Internet access.

**FIGURE 1B: CHILDREN'S INTERNET DRAWINGS**

"I'm making a computer. I have four computers in my house and I got a laptop."

--Girl, Age 6 years, 4 months



*Child attitudes:* In contrast to parental attitudes, children's preferences for computers were mostly unrelated to family SES, computer ownership and at-home Internet access. Specifically, these variables did not moderate children's knowledge of the Internet, computer preference for positive traits, or favorite activity. This suggests that disadvantaged children are exposed to computers and the Internet outside the home, highlighting the importance of in-school computer access. The Kaiser Family Foundation (Roberts et al. 1999) reported that children's (ages 2-18) in-school computer use did not differ as a function of the child's zip code income level or parent education. Becker's (2000) nationwide

survey of teachers revealed that lower-SES students used computers in school more often in a given week than higher-SES students.

The results of the present study support the idea that in-school access to computers and the Internet can redress some of society's technological inequalities. Access, however, remains only one aspect of the digital divide. As discussed above, the quality of lower SES children's in-school computer and Internet access is generally inferior to that of their middle and higher SES counterparts (CPB 2003; Attewell 2001; Becker 2000). While the present study was not designed to assess the quality of children's in-school computer access, it is clear that schools must not only provide students with computer hardware and software, but also with the skills needed to take full advantage of the intellectual benefits computer and Internet technology have to offer.

Interestingly, the results of this study indicate that socioeconomic status, at-home computer access, and at-home Internet access do play a role in children's perceptions of "learning" media. Children from lower-SES homes and children without access to a computer or the Internet at home were more likely than their more advantaged counterparts to choose the computer as a learning medium. Thus, children from lower SES families do not seem to be adopting their parents' attitudes towards computers and the Internet, (i.e., that computers serve more of an entertainment—as opposed to an educational—function). This can possibly be explained by the fact that these children are exposed to computers and the Internet primarily in a school environment, creating a strong link between computer technology and learning. In contrast, children in working class and middle-class homes are experiencing cross-cutting pressures—at school they use the computer for educational tasks, while at home they use the computer for more recreational purposes. These disparate activities may situate their perceptions of computers and the Internet in an entertainment context. Whether these perceptions now translate into less mental effort and subsequent decreased learning remains to be seen, although Salomon (1985) and Linebarger (2001) provide evidence that would support this argument.

*Gender:* The results also challenge traditional assumptions about new technology and gender. Unlike previous research suggesting girls are uninterested in, ambivalent about, or unable to effectively use the computer or Internet, girls in this study demonstrated a greater preference for and affinity toward computers than boys. Girls scored significantly higher than boys on the measure of computer choice for positive traits/emotions, and girls were significantly more likely than boys to select the computer as their favorite activity. When asked why they chose the computer as their favorite activity, 5 of the 8 girls said that using the computer was fun or that they could use it to play. Given that new information technologies (both in home and work environments) have traditionally been dominated by men, these findings are extremely

encouraging. Young girls do not appear to be intimidated by or disinterested in computer technology; in fact, they are embracing it.

Finally, we document a creative assessment process which helped the children in this study to organize and consequently communicate their thoughts about the Internet (Montasser et al. 2002; Stafstrom et al. 2002). While the children's drawings and descriptions of the Internet revealed no differences in knowledge by gender, SES, computer ownership, or at-home Internet access, this coding process highlighted the importance of assessing drawings in conjunction with children's verbal descriptions of their work. The children's drawings often consisted solely of a computer (see Figures 1a and 1b). Taken alone, these pictures would have been coded as "knew Internet was related to computers," since the drawings did not include images related to connectivity.

However, in several cases, the children's verbal descriptions revealed that they did indeed understand what was meant by "the Internet." For example, the child who drew Figure 1a (age 6) explained his drawing by saying "...You play games, you look up stuff, check your messages that people send you. My brother knows; I don't know how. You can order pizza and look up movies, and it's a lot cheaper for pizza on the Internet." In contrast, the child who drew Figure 1b (age 6) explained her drawing by saying, "I'm making a computer. I have four computers in my house and I got a laptop."

Clearly, the child who drew Figure 1a exhibited a relatively sophisticated understanding of the Internet, while the child who drew Figure 1b knew only that the Internet was somehow related to computers. Without the verbal descriptions, this discrimination would have been lost, and the data would have provided an inaccurate sense of children's knowledge of the Internet.

*Limitations:* There are two limitations that moderate these findings. First, because the research was designed to be exploratory, the sample was small and perhaps unrepresentative. The study's interesting trends need further investigation to verify whether they transcend the contexts in which the data were collected (i.e., Kansas and New York; low to working class families; very young children) across children of different ages. Second, although computers and the Internet were investigated, the full potential multiple functions of the computer (e.g., email, chat rooms, gaming, information gathering) were not. At times, when a child was asked why he/she picked a particular medium, there was limited evidence that children were after choosing the computer for very different reasons (e.g., to play games, to email).

In sum, these very young children and their parents provided clear descriptions regarding their thoughts about the computer and the Internet. Although exploratory in nature, these findings underscore the need to investigate digital divide issues using more complex measures, moving beyond contrasts of families with and without computers and the Internet. In addition, these findings underscore the importance of asking children directly about their beliefs rather than using parents as proxies (Borgers et al. 2000) and of devising

techniques that allow young children to adequately display their knowledge and beliefs (Pellegrini and Bjorklund 1998). For parents, perceptions were related primarily to the presence of a computer, in-home Internet access and family SES. In some ways, parental attitudes fell more closely along a traditional notion of a digital divide (i.e., the *haves* and the *have-nots*).

More encouragingly, children's ideas about computers and the Internet were mostly unrelated to computer ownership and family SES. In the one instance where family SES mattered, children from lower SES families were *more* likely to situate the computer in an educational context, seeking it out when they wanted to learn something new. It now becomes especially important to ascertain whether these perceptions are related to learning.

## REFERENCES

- Attewell, P. 2001. The First and Second Digital Divides. *Sociology of Education*, 74: p. 252-259.
- Becker, H. J. 2000. Who's Wired and Who's Not: Children's Access to and Use of Computer Technology. *Future of Children*, 10: p. 44-75.
- Borgers, N., de Leeuw, E. and Hox, J. (2000). Children as Respondents in Survey Research: Cognitive Development and Response Quality. *Bulletin de Methodologie Sociologique*, 66: p. 60-75.
- Children's Partnership. 2000. *Online Content for Low-income and Underserved Americans: The Digital Divide's New Frontier. A Strategic Audit of Activities and Opportunities*. Available at: [http://www.childrenpartnership.org/pub/low\\_income/low\\_income.pdf](http://www.childrenpartnership.org/pub/low_income/low_income.pdf)
- Corporation for Public Broadcasting. 2003. *Connected to the Future*. Available at: <http://www.cpb.org/ed/resources/connected/>
- Gross, J., and Hayne, H. 1998. Drawing Facilitates Children's Verbal Reports of Emotionally-Laden Events. *Journal of Experimental Psychology*, 4: p. 163-179.
- Kafai, Y. B. 1996. Electronic Play Worlds: Gender Differences in Children's Construction of Video Games. In Kafai, Y. and Resnick M. (eds.) *Constructionism in Practice: Designing, Thinking, and Learning in a Digital World*. Mahwah, NJ: Erlbaum.
- Linebarger, D. L. 2001. Learning to Read from Television: The Effects of Using Captions and Narration. *Journal of Educational Psychology*, 93: p. 288-298.
- Linebarger, D. L. 2002. *Children, Parents, and Perceptions*. A Report Prepared for Sesame Workshop. Philadelphia, PA: Annenberg School for Communication, University of Pennsylvania.
- Livingstone, S. and Bovill, M. 2001. *Children and Their Changing Media Environment: A European Comparative Study*. Mahwah, NJ: Erlbaum.

- Montasser, A., Cole, C. F. and Fuld, J. 2002. The Tower in Red and Yellow: Using Children's Drawings in Formative Research for *Alam Simsim*, an Educational Television Series for Egyptian Children. *Early Education and Development*, 13 :p. 395-408.
- National School Boards Foundation. 2000. *Research and Guidelines for Children's Use of the Internet*. Available at: <http://www.nsb.org/safe-smart/full-report.htm>
- Roberts, D. F., Foehr, U G., Rideout, V. J. and Brodie, M. 1999. *Kids and Media at the New Millennium: A Kaiser Family Foundation Report*. Menlo Park, CA: Kaiser Family Foundation.  
Available at: <http://www.kff.org/content/1999/1535/>
- Pellegrini, A. D. and Bjorklund, D. 1998. *Applied Child Study: A Developmental Approach*. Mahwah, NJ: Erlbaum.
- Salomon, G. 1985. The Study of Television in a Cross-Cultural Context. *Journal of Cross-Cultural Psychology*, 16: p. 381-397.
- Scott, J. 1997. Children as Respondents: Methods for Improving Data Quality. In Lyberg, L., Biemer, P., Collins, M., de Leeuw, E., Dippo, C., Schwarz, N. and Trewin, D. (eds.) *Survey Measurement and Process Quality*. New York: Wiley.
- Stafstrom, C. E., Rostasy, K. and Minster, A. 2002. The Usefulness of Children's Drawings in the Diagnosis of Headache. *Pediatrics*, 109: p. 460-472.
- Subrahmanyam, K. and Greenfield, P. M. 1999. Computer Games for Girls: What Makes Them Play? In Cassell, J. and Jenkins, H. (eds.) *From Barbie to Mortal Kombat: Gender and Computer Games* Cambridge, MA: The MIT Press.
- Turow, J. 1999. *The Internet and the Family: The View from the Parents and the View from the Press*. Philadelphia, PA: Annenberg Public Policy Center.  
Available at: <http://www.appcpenn.org/Internet/family/rep27.pdf>
- Wilhelm, T., Carmen, D. and Reynolds, M. 2002. *Connecting Kids to Technology: Challenges and Opportunities. A Report prepared for the Annie E. Casey Foundation*.  
Available at: [http://www.aecf.org/publications/pdfs/snapshot\\_june2002.pdf](http://www.aecf.org/publications/pdfs/snapshot_june2002.pdf)

**TABLE 2: MAJOR DEMOGRAPHIC CHARACTERISTICS OF THE SAMPLE**

<b>Attribute</b>	<b>Description</b>	<b>National Sample (%)<sup>ii</sup></b>	<b>All (%)</b>	<b>Kansas</b>	<b>New York</b>
Total	Entire Sample		74	36	38
Child Characteristics	Number of Boys		37	17	19
	Number of Girls		37	20	18
	Birth Order		1.77	1.93	1.62
Race/Ethnic Group	African-American	12.3%	12 (16%)	6	6
	European-American	75.1%	47 (64%)	28	19
	Hispanic-American	12.5%	5 (7%)	0	5
	Native American	0.9%	2 (3%)	0	2
	Other/Not Reported	5.5%	4/4 (11%)	0/2	4/2
Demography	Mom- Education	80.4% with HS diploma	13.80	12.87	14.67
	Dad- Education		14.21	13.67	14.75
	Income	\$50,046	\$62,121	\$48,999	\$74,553
	Number in Family	2.63	4.36	4.64	4.11
SES	Lower SES	32.8%	14 (19%)	10	4
	Working Class SES	39.4%	40 (54%)	18	22
	Middle SES	27.8%	20 (27%)	8	12

*Note. National access data taken from Woodard (2000).*

- 
- <sup>i</sup> US Census Bureau (2002). Available on-line at <http://factfinder.census.gov/servlet/BasicFactsServlet>.
- <sup>ii</sup> US Census Bureau (2002). Available on-line at <http://factfinder.census.gov/servlet/BasicFactsServlet>.