Rathbun, A., West, J., & Hausken, E. G. (2003). Young children's access to computers in the home and at school in 1999 and 2000 [Executive summary] (NCES 2003-036). Washington, DC: National Center for Education Statistics.

Executive Summary

Over the past decade, technology has changed at such a rapid pace that computers and Internet access are fast becoming indispensable features of modern life. Computer literacy and skills are increasingly necessary in a knowledge-based economy. More children are being introduced to computers than ever before, evidenced by the fact that in 2000 65 percent of children had access to a home computer, compared with 32 percent in 1993 (Newburger 1999; 2001). Students' use of computers at school also increased from 61 percent in 1993 to 71 percent in 1997 (Newburger 1999).

As part of the *No Child Left Behind Act of 2001* (NCLB, P.L. 107-110), the Enhancing Education Through Technology (ED Tech) program seeks to improve achievement in elementary and secondary schools through the use of technology, to assist students to become technically literate by the eighth grade, and to ensure that teachers integrate technology into the curriculum to improve student achievement. There are also provisions in the act to provide funding for schools to purchase technology resources to further the program's goals.

As computers become more prevalent and computer skills more necessary, there continues to be a "digital divide" between those with computer access and skills and those without. Already, gaps exist across racial/ethnic groups and family income levels with respect to computer ownership and Internet usage (Economics and Statistics Administration 2000). For instance, a lower percentage of Black and Hispanic households have Internet access in their homes, compared to the national average (Newburger 2001). These differences are less pronounced in schools, where children's access to computers and the Internet are more prevalent. In a 1999 U.S. Department of Education study, almost all public school teachers (99 percent) indicated that computers were available in their schools, and the nationwide ratio of students to instructional computers was about 6 to 1 (Smerdon et al. 2000). The Department also reported that 95 percent of all public schools had access to the Internet in 1999, compared with only 35 percent in 1994 (Snyder and Hoffman 2002).

Few studies have focused exclusively on kindergartners' and first-graders' access to and use of computers in different settings. Reports that exist on students' computer access and use either focus on upper elementary and high school students (Becker 2000), or combine prekindergarten and kindergarten children into one category and elementary school children (grades 1–8) into a second category (Snyder and Hoffman 2002) when reporting information.

The Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K) provides a unique opportunity to describe children's access to and use of computers in their schools, classrooms, and homes as they begin formal schooling. The computer resources identified in this report include access in schools to computer labs, CD-ROMs, local area networks (LAN), and wide area networks (WAN)/Internet; access in classrooms to computer areas and teachers trained in using computers and technology; and access in homes to computers and the Internet. The report also looks at the ways in which young children use computers at home and school. For example, information is provided on children's frequency and types of home computer use, and on the frequency with which children use computers in their classrooms for different instructional purposes. In addition, the report examines changes in computer resources and use from kindergarten to first grade and looks at the relationship between computer resources and computer use.

Children's access to and use of computers in their schools, classrooms, and homes are examined overall and in relation to children's sex, race/ethnicity, socioeconomic status (SES)[1], and disability status. In addition, children's use of computers for various instructional purposes is compared by several characteristics of their teachers and classrooms.

[1]This composite in the ECLS-K database is derived from the following variables: mother/female guardian's education level, father/male guardian's education level, mother/female guardian's occupation, father/male guardian's occupation, and household income.

Research Questions

Data from the ECLS-K are used to examine 10 questions related to young children's access to and use of computers.

Access to Computer Resources

1. What computer resources are available in the schools, classrooms, and homes of kindergartners?
2. Are these resources equally available to girls and boys, economically disadvantaged and advantaged students, and minority and nonminority children?
3. What school and classroom computer resources are available to children from homes with various computer resources?
4. Does the level of computer resources that are available in the schools, classrooms, and homes of young children change from kindergarten to first grade?

Use of Computer Resources

5. How frequently do kindergartners use computers in their classrooms and homes, and for what purposes?
6. Do certain groups of children use computers more often than others in each of these learning environments?
7. Does the frequency of children's use of computers in their homes, classrooms, and schools change from kindergarten to first grade?
8. How frequently do young children use computers over summer vacation?
9. What opportunities do children with and without home computer resources have to use computers in their classrooms?
10. Do children who use computers more often at home also use them more often in their classrooms?

Data Source

The ECLS-K, sponsored by the U.S. Department of Education's National Center for Education Statistics (NCES), is a multisource, multimethod study that focuses on children's early education, beginning with a nationally representative sample of kindergartners in the fall of 1998 and following them through the spring of fifth grade. The ECLS-K includes measures of children's health and socioemotional status, academic achievement, and their family, classroom, school, and community environments. The study collects information directly from the children and their families, teachers, and schools. The full ECLS-K base-year sample is comprised of approximately 22,000 public and private school children who attended over 1,200 kindergarten programs during the 1998–99 school year.

Data for this report are from the kindergarten and first-grade waves of data collection.[2] The first set of results on computer resources (i.e., tables 3, B-1, B-2, and B-3) showed significant differences in kindergartners' computer access by school control (public vs. private). Thus, the majority of the report presents results for public school children so that any variations found in computer access and use related to child and classroom characteristics would not be confounded by school control. The majority of this report is based on 14,666 public school kindergartners and 11,456 public school first-grade children.[3]

Findings

Findings in this report are organized into the two sections identified by the research questions. Part one describes parents, teachers, and school administrators' reports of young children's access to computer resources in their schools, classrooms, and homes. Results are presented for the population of kindergarten and first-grade children and in relation to child and family characteristics. Part two describes ways in which young children were reported to use computers in their classrooms and homes. Results in this section are presented for the

[2]Data for kindergarten children are weighted by the round 2 parent cross-sectional weight, C2PW0; data for summer computer use prior to first grade are weighted by the round 3 parent cross-sectional weight, C3PW0; and first-grade data are weighted by the round 4 cross-sectional parent weight, C4PW0.
[3]Children who repeated kindergarten while in the study were not included in the analysis of first-grade data. Approximately 5 percent of kindergartners were not promoted to first grade by the second year of the ECLS-K data collection.

population of kindergarten and first-grade children and in relation to child, family, teacher, and classroom characteristics. All comparisons made in the text were tested for statistical significance to ensure that differences are larger than might be expected, due to sampling variation. All differences reported were significant at the .05 level.[4]

Young Children's Access to Computers

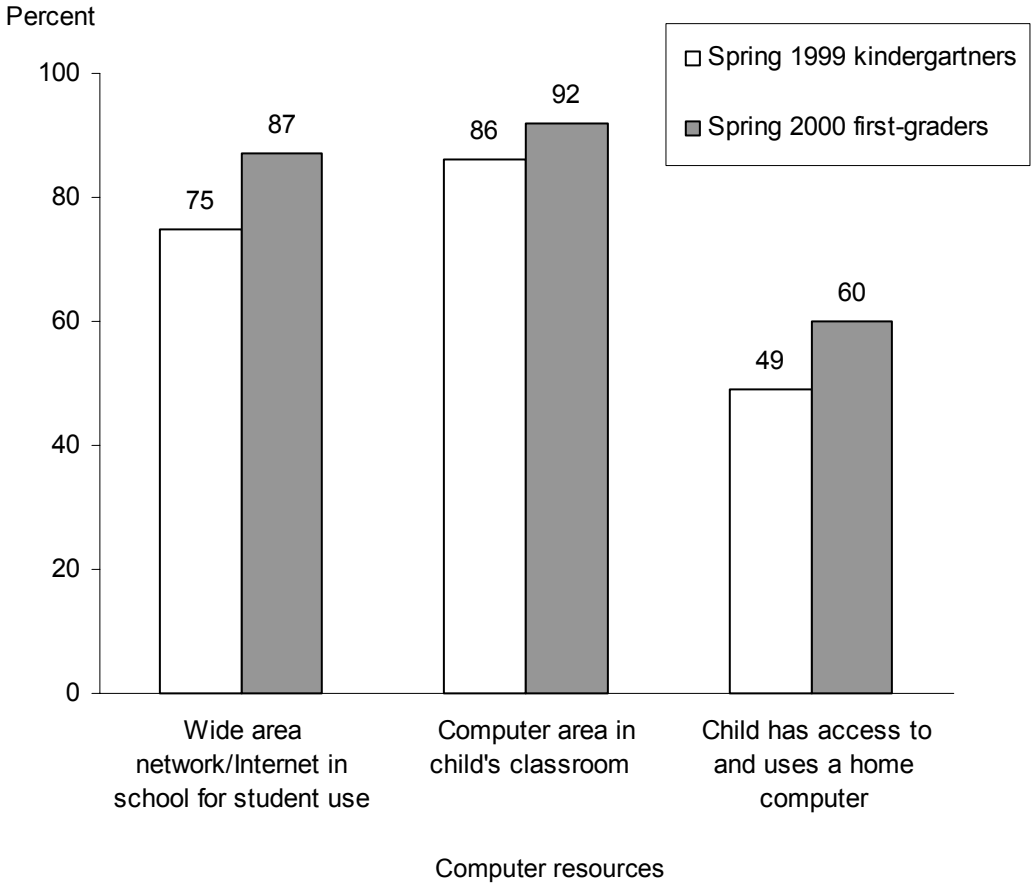
Almost all young children had access to computers, either at home or in their classrooms and schools. However, kindergartners' access to computer resources differed by the type of school they attended (tables 3, B-1, and B-2). Public school kindergartners had greater access to school and classroom resources, whereas private school children had greater access to home computer resources. Focusing on public school children, the findings showed that children's access to most computer resources at school and home increased from kindergarten to first grade (figure A, table 5). Changes in children's access to computer resources may be due not only to the change in grade level but also to the general growth in computer resources from the Spring of 1999 to the Spring of 2000.

School computer resources. For the most part, young children's access to school computer resources did not differ greatly by child and family characteristics (tables B-4, B-6, B-7, B-8, and B-9). However, in kindergarten some minority children and those from lower-SES families were less likely to attend schools that provided Internet access to students than other children. In first grade, children from the lowest SES group continued to have less student access to the Internet in comparison to first-graders in the highest SES group.

Classroom computer resources. Kindergarten and first-grade children in the lowest SES group were less likely to have a computer area in their classroom than children in the highest SES group (tables B-7 and B-11). In kindergarten, access to computer areas in the classroom and to teachers who had attended computer/technology workshops did not differ by children's race/ethnicity. In contrast, Hispanic first-graders were less likely than White first-graders to have a computer area in their classroom, and were less likely than White and Black first-graders to have teachers who had attended a computer/technology workshop during the school year.

[4]Not all statistically significant differences are discussed in this report. Due to the large sample size, many differences (no matter how substantively minor) are statistically significant. Thus, only differences of 5 percent or more between groups are reported, unless an activity is very infrequent (e.g., Internet use) or a resource is rarely available (e.g., Internet access).

Figure A. Percent of public school children who had access to various computer resources in their schools, classrooms, and homes: Kindergarten of spring 1999 and first grade of spring 2000



SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), Spring 1999 and Spring 2000.

Home computer resources. In kindergarten and first grade, children from low-SES families were least likely to have access to home computers. Black and Hispanic kindergartners and first-graders were less likely to have home computer access than White and Asian/Pacific Islander children (tables 4 and 6). The same patterns were detected for kindergartners' home access to the Internet. Also, in first grade, children with disabilities were less likely to have access to home computers than children without disabilities.

Relationship between home and school computer resources. For the most part, young children's access to school and classroom computer resources did not differ by their level of home computer resources. However, a higher percentage of kindergartners who had access to

and used computers and the Internet at home attended schools that provided Internet access for students, compared to kindergartners without home computer resources (figure 3, table B-8).

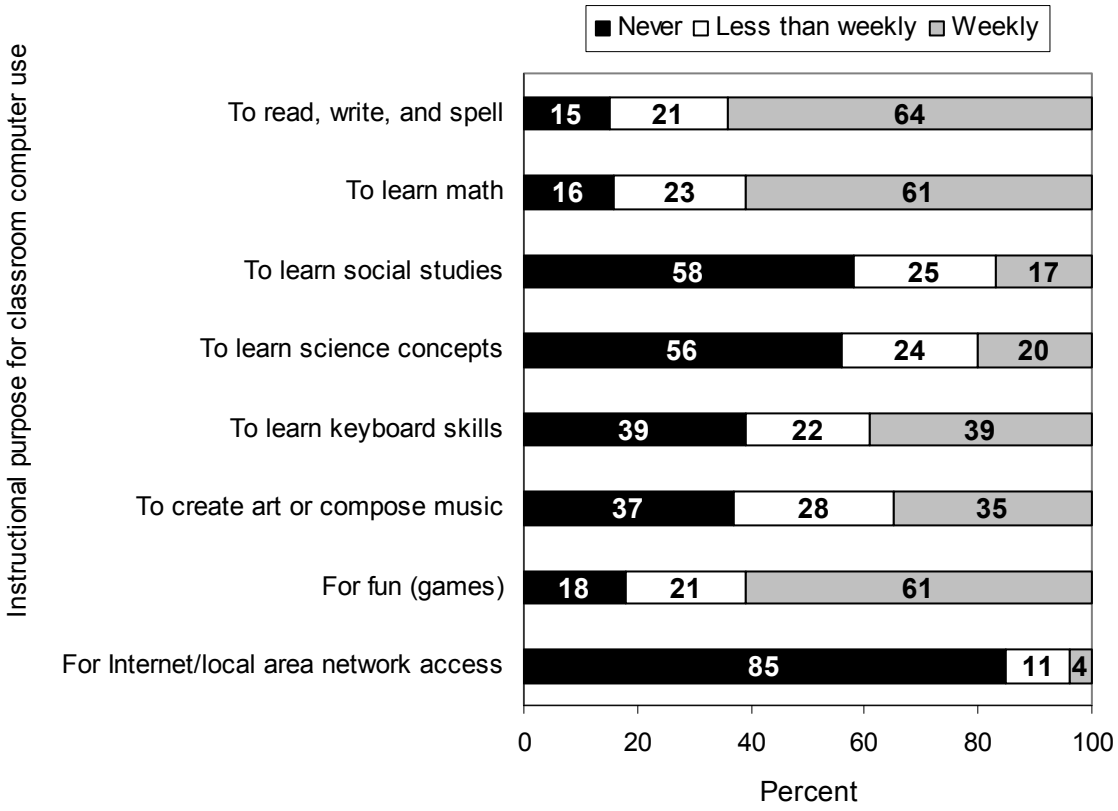
Young Children's Use of Computers

Classroom computer use. The majority of young children in public schools were in classrooms where computers were used for instructional purposes on a weekly basis. The most frequent classroom uses for computers were to learn reading, writing, and spelling; to learn math; and for fun (figure B). Classroom Internet use for young children was not prevalent; 4 percent of public school kindergartners and 9 percent of public school first-graders accessed the Internet on a weekly basis in their classes. Young children's use of computers in the classroom for different instructional purposes tended to vary by teacher and classroom characteristics (tables 8, B-13, and B-14). For instance, kindergartners participating in full-day kindergarten programs and those with computer areas in their classrooms were more likely to be in classes that used the computer on a weekly basis for reading, writing, and spelling; mathematics; social studies; keyboarding instruction; art creation or music composition; and fun than children in part-day kindergarten programs and those without computer areas in their classrooms. Also, kindergartners whose teachers participated in computer/technology workshops and those whose teachers did not spend more than half of the instructional day in teacher-directed, whole-class activities were more likely to be in classes that used the computer on a weekly basis for these purposes than kindergartners whose teachers had not attended computer/technology workshops during the school year or those whose teachers spent more than half of the instructional day in teacher-directed, whole-class activities. These patterns were consistent for first-grade children as well.

Home computer use. Public school children who had access to home computers used them an average of 3 to 4 days a week (tables 9 and 11). Over 85 percent of young children with home computers used them for educational purposes. The frequency with which kindergarten and first-grade children used home computers did not tend to differ by child or family characteristics; however, the purposes for which young children used computers at home varied by children's sex, race/ethnicity, and SES. For example, family SES was positively related to children's use of home computers for educational purposes overall and for those children who had access to home computers. In kindergarten, girls who had access to home computers used them more often for art or drawing programs than boys did. Also, White kindergartners with home computer

access were more likely than Hispanic and Asian/Pacific Islander kindergartners to use them to play with educational programs, and more likely than Black or Hispanic kindergartners to use them for art or drawing programs.

Figure B. Percentage distribution of the frequency that public school kindergartners used computers in their classrooms for different instructional purposes: Spring 1999



SOURCE: U.S. Department of Education, National Center for Education Statistics, Early Childhood Longitudinal Study, Kindergarten Class of 1998–99 (ECLS-K), Spring 1999.

In the summer prior to first grade, few public school children used computers in structured summer programs (table 12). However, almost three-quarters of children used home computers in the summer on a weekly basis to play games[5] or for educational purposes (table 14). The percentage of public school children using computers for different purposes in the summer also

[5]Parents were asked how often their child used the computer for games like Nintendo or Sega over a 1-week time period. No definition of "computer" was provided to respondents; thus, it is possible that some parents may have included other noncomputer game devices (e.g., handheld or TV game systems) when responding to the item.

varied by children's sex, race/ethnicity, and SES. In the summer, a higher percentage of boys than girls, and a higher percentage of White than Hispanic children used home computers. Family SES was also positively related to children's summer computer use.

Relationship between home and classroom computer use. Young children's classroom computer use in public schools did not differ based on whether children had home access to computers or the Internet (table 15). In addition, there was no significant relationship between the frequency of home computer use and the frequency of classroom computer use for different instructional purposes for young children attending public schools (tables B-16 and B-17).

Conclusion

Although almost all young children had access to computers, at home or in their classrooms and schools, the differences in the amount of access varied according to children's school type, race/ethnicity, and family SES. Public school kindergartners tended to have greater access to school and classroom computer resources, whereas private school kindergartners had greater access to home computer resources. Young children's access to most computer resources in public schools did not differ greatly by child and family characteristics; however, in kindergarten some minority children, those from lower SES families, and those without home computer resources were less likely to attend schools that provide student access to the Internet. In terms of classroom computer resources, kindergartners and first-graders from the lowest SES group were less likely to have a computer area in their classroom than children in the highest SES group. In first grade, public school Hispanic children were less likely to have access to computers in their classrooms than White children, and Hispanic first-graders were less likely to have teachers who had attended a computer/technology workshop than White and Black first-graders—findings that did not occur in kindergarten. In terms of home computer resources, public school children's access varied by race/ethnicity and family SES, with minority and disadvantaged children being less likely to have home access to computer resources in kindergarten and first grade. Public school children's access to computer resources at school and home tended to increase as they moved from kindergarten to first grade.

Over half of all public school children attended classrooms where computers were used for various instructional purposes at least once a week. Young children's use of computers in their classrooms differed, however, by several classroom characteristics, including kindergarten

program type (part day vs. full day), teachers' attendance at computer/technology workshops during the school year, presence of a computer area in the classroom, and the proportion of time classes spent in teacher-directed, whole-class instruction.

For those public school young children with access to home computers, all children used their home computers an average of about 3 to 4 days each week. However, the purposes for which young children used home computers during the school year and over summer vacation (e.g., to access the Internet, play educational games) varied by children's sex, race/ethnicity, and SES.

The ECLS-K provides a wealth of information on children's cognitive, socioemotional, and physical development from kindergarten through fifth grade across multiple contexts, including the home, classroom, school, and community. Since this report shows differences in computer access and use between public and private school children, additional analyses could focus on child and family characteristic differences within private school settings. Based on the findings from this report, future research could also examine the relationships between children's access to and use of computers in different settings with their academic achievement over time. Also, information on computer resources and use could be further explored at the school and classroom level to identify differences based on characteristics of the schools that young children attend. For example, children's access to school computer resources could be examined in terms of school size, grade range, federal program participation, urbanicity, and region.