Chapter 6

Barriers to Teachers' Use of Technology

Highlights

- In 1999, the barriers to the use of computer and the Internet for instruction most frequently reported by public school teachers were not enough computers, lack of release time for teachers to learn how to use computers or the Internet, and lack of time in schedule for students to use computers in class. Among the barriers most frequently reported by teachers to be "great" barriers to their use of computers or the Internet for instruction were not enough computers and lack of release time for teachers to learn how to use computers or the Internet.

- Teachers' perceptions of barriers to technology use varied by a number of teacher and school characteristics. For example, secondary teachers, teachers in large schools, and teachers in city schools were more likely than elementary teachers, teachers in small schools, and teachers in rural schools, respectively, to report that not enough computers was a great barrier. Additionally, elementary teachers were more likely to report the lack of time in the schedule for students to use computers in class as a great barrier than secondary teachers. Furthermore, teachers with more years of experience were generally more likely than less experienced teachers to cite the lack of release time to learn, practice, or plan ways to use computers or the Internet as a great barrier.

- Generally, teachers who perceived lacking computers and time for students to use computers as great barriers were less likely than those who did not perceive these conditions as barriers to assign students to use computers or the Internet for some instructional activities.

CHAPTER 6

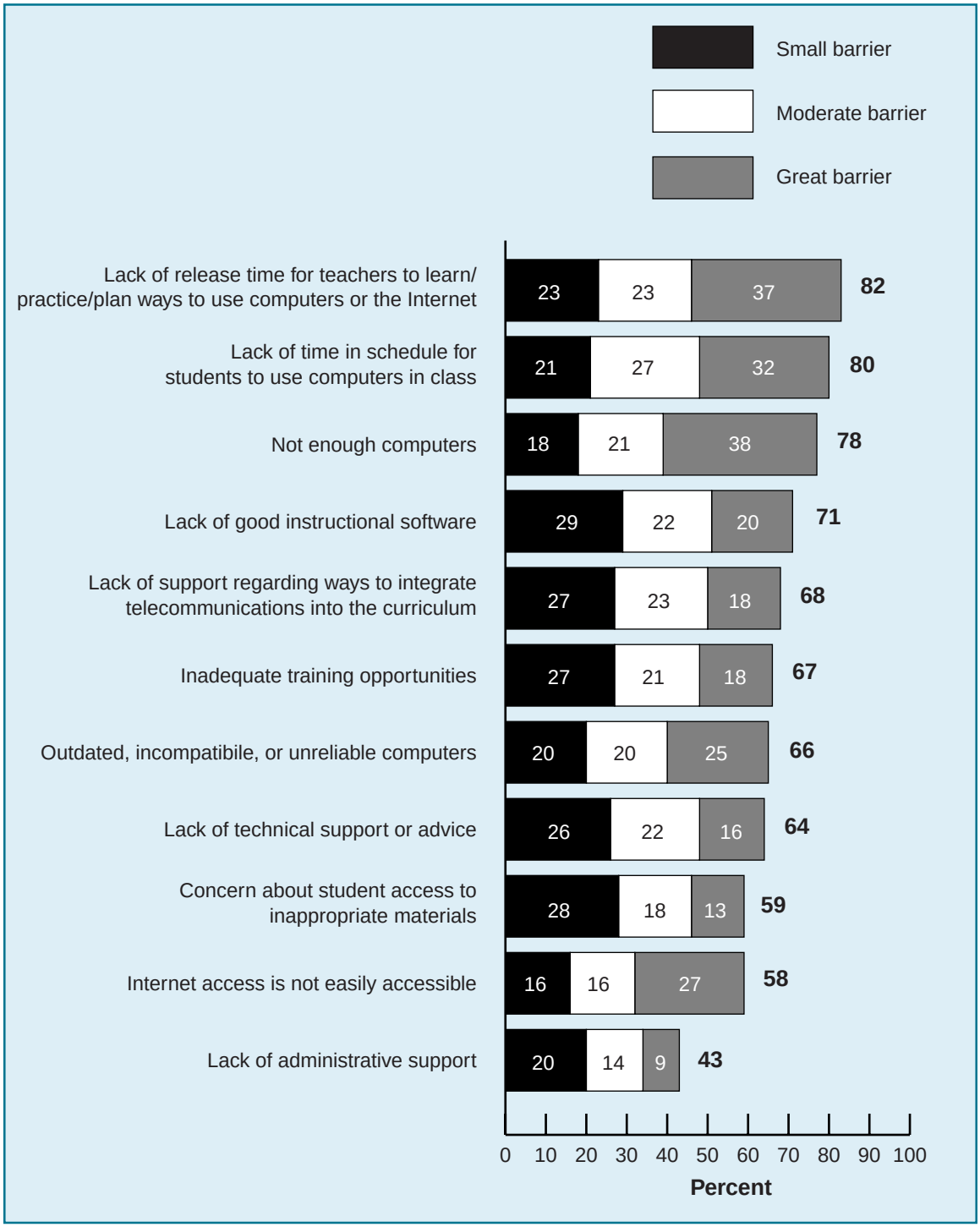
Barriers to Teachers' Use of Technology

The 1999 FRSS survey asked teachers whether and the extent to which they encountered the following barriers to their use of school computers or the Internet for instruction:

- not enough computers,
- outdated, incompatible, or unreliable computers,
- lack of good instructional software,
- Internet access is not easily accessible,
- concern about student access to inappropriate materials,
- lack of release time for teachers to learn, practice, or plan ways to use computers or the Internet,
- lack of time in schedule for students to use computers in class,
- inadequate training opportunities,
- lack of administrative support,
- lack of support regarding ways to integrate telecommunications into the curriculum, and
- lack of technical support or advice.

This chapter first presents information on the extent to which teachers perceived these to be barriers, followed by an examination of differences by teacher and school characteristics. The final section of the report explores the relationships between barriers reported by teachers and selected instructional activities.

FIGURE 6.1. PERCENT OF PUBLIC SCHOOL TEACHERS REPORTING SMALL, MODERATE, OR GREAT BARRIERS TO THEIR USE OF COMPUTERS AND THE INTERNET FOR INSTRUCTION: 1999



NOTE: Teachers who reported that computers were not available to them anywhere in the school were excluded from the analyses presented in this figure. Detail may not sum to totals due to rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Barriers to Technology Use

In 1999, the barriers to the use of computer and the Internet for instruction most frequently reported by public school teachers were insufficient numbers of computers, lack of release time for teachers to learn how to use computers or the Internet, and lack of time in schedule for students to use computers in class (78 percent, 82 percent, and 80 percent of teachers, respectively—figure 6.1). In addition, 71 percent reported the lack of good instructional software, and 58 percent of teachers reported difficult Internet access as barriers. Furthermore, approximately two-thirds of all teachers reported the lack of adequate equipment, training opportunities, technical support or advice, and support regarding ways to integrate telecommunications into the curriculum as barriers (66 percent, 67 percent, 64 percent, and 68 percent, respectively). Fifty-nine percent also reported that a concern about student access to inappropriate materials was a barrier. Lack of administrative support was least likely to be reported as a barrier (43 percent). Among the barriers most frequently reported by teachers to be "great" barriers to their use of computers or the Internet for instruction in 1999 were not enough computers, lack of release time for teachers to learn how to use computers or the Internet, and lack of time in students' schedule to use technology (38 percent, 37 percent, and 32 percent, respectively).

Differences in Teachers' Reports of Great Barriers

Availability of and Access to Computers and the Internet

In order for teachers to integrate technology into their instruction, technology must be available and accessible to them. This section examines barriers to teachers' use of technology that involve availability of and access to computers and the Internet. More specifically, it looks at differences in teachers' reports of the lack of computers, lack of adequate computers, and difficulty accessing the Internet (38 percent, 25 percent, and 27 percent of teachers, respectively, reported these to be great barriers to their use of technology for instruction).

Teachers' reports that not having enough computers was a great barrier varied by instructional level, school size, and school location (table 6.1). Secondary teachers were more likely than elementary teachers to indicate that not having enough computers was a great barrier (43 percent compared with 36 percent). In addition, teachers in schools with 300 or more students were more likely than teachers in schools with fewer than 300 students to report that not having enough computers was a great barrier (38 percent and 46 percent, compared with 25 percent). Moreover, teachers in city schools were more likely than those in rural schools to report that not enough computers was a great barrier (43 percent compared with 31 percent).

TABLE 6.1. PERCENT OF PUBLIC SCHOOL TEACHERS REPORTING VARIOUS BARRIERS AS GREAT BARRIERS TO THE USE OF COMPUTERS AND THE INTERNET FOR INSTRUCTION, BY SCHOOL CHARACTERISTICS: 1999

School characteristics	Great barriers		
	Not enough computers	Outdated, incompatible, or unreliable computers	Internet access not easily accessible
All public school teachers	**38**	**25**	**27**
Instructional level			
Elementary	36	27	28
Secondary	43	21	23
Enrollment size			
Less than 300	25	24	21
300 to 999	38	26	27
1,000 or more	46	24	27
Locale			
City	43	29	28
Urban fringe	39	25	27
Town	38	22	23
Rural	31	23	26
Percent minority enrollment in school			
Less than 6 percent	35	22	24
6 to 20 percent	35	22	20
21 to 49 percent	38	26	27
50 percent or more	45	32	36

NOTE: Teachers who reported that computers were not available to them anywhere in the school were excluded from the analyses presented in this table.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

There were also differences in teachers' reports of outdated, incompatible, or unreliable computers being a barrier. For example, elementary teachers were more likely to report that this was a great barrier than secondary teachers (27 percent compared with 21 percent). Additionally, teachers in schools with more than 50 percent minority enrollments were more likely to cite outdated, incompatible, or unreliable computers as a great barrier than teachers in schools with less than 6 percent minority enrollments (32 percent compared with 22 percent).

Similar differences were found for not having easy Internet access as a barrier. Elementary teachers cited this barrier more frequently than secondary teachers (28 percent compared with 23 percent). Additionally, teachers in schools with more than 50 percent minority enrollments were more likely to report not having easy Internet access as a great barrier than teachers in schools with less than 6 percent minority enrollments and 6 to 20 percent minority enrollments (36 percent compared with 24 percent and 20 percent, respectively).

Lack of Time

Among the greatest barriers to the use of technology in instruction reported was lack of time. The section examines two types of time limitations. The first is the lack of release time for teachers to learn, practice, or plan ways to use computers or the Internet for instruction. The second is the lack of time in the schedule for students to use computers and the Internet in class.

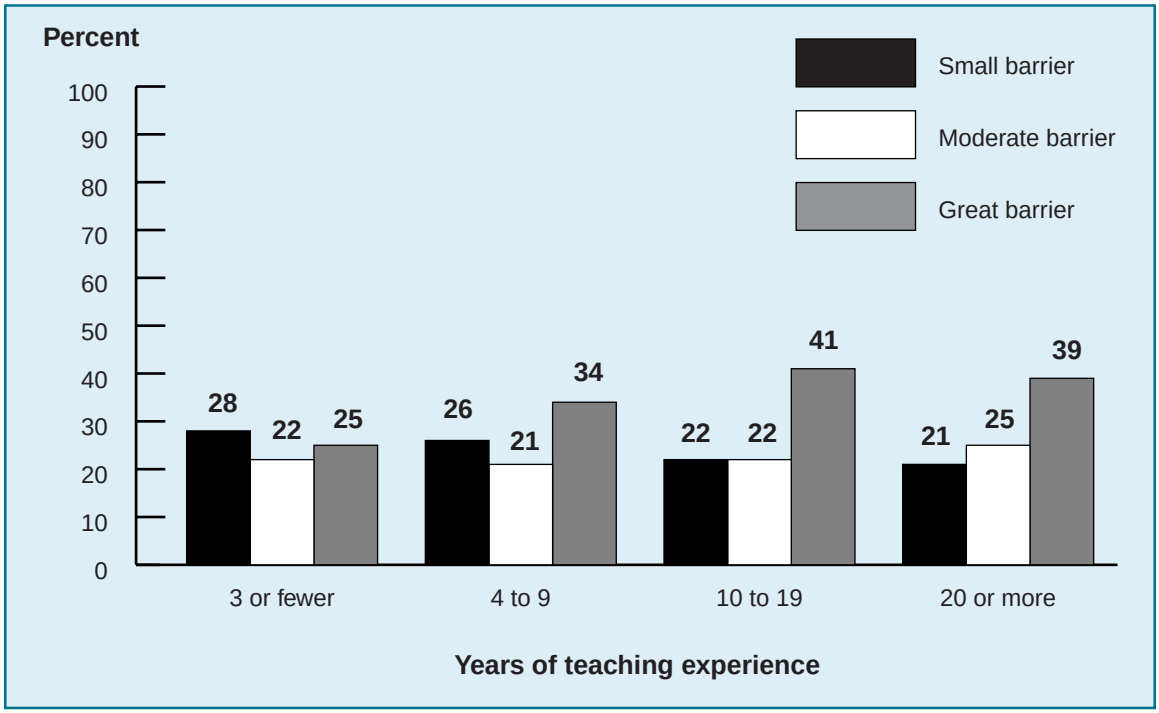
Although teachers' reports of lack of training opportunities did not differ significantly by teacher or school characteristics (table A-6.3), release time did (figure 6.2). Specifically, teachers with more years of teaching experience (10 to 19 years and 20 or more years of experience) were more likely than teachers with the least experience (3 or fewer years) to report that a lack of release time was a great barrier (41 percent and 39 percent, compared with 25 percent). Additionally, elementary teachers were more likely than secondary teachers to report a lack of time in the schedule for students to use computers and the Internet in class as a great barrier (34 percent compared with 28 percent—table A-6.3).

Institutional and Technical Support for Using Technology

This section examines teachers' perceptions of the lack of administrative and technical support, as well as lack of support regarding ways to integrate computers and the Internet into the curriculum as barriers to their use of computers and the Internet for instruction.

The lack of administrative support as a great barrier varied by years of teaching experience. Specifically, teachers with 10 to 19 years of experience cited this as a great barrier more frequently than teachers with 20 or more years of experience (13 percent compared with 7 percent—table A-6.3). There were also differences in teachers' reports of the lack of support regarding ways to integrate telecommunications into the curriculum as a great barrier by minority enrollments. That is, 24 percent of teachers in schools with 50 percent or more minority

FIGURE 6.2. PERCENT OF PUBLIC SCHOOL TEACHERS REPORTING LACK OF RELEASE TIME TO LEARN, PRACTICE, OR PLAN WAYS TO USE TECHNOLOGY AS A SMALL, MODERATE, OR GREAT BARRIER TO THE USE OF COMPUTERS AND THE INTERNET FOR INSTRUCTION, BY YEARS OF TEACHING EXPERIENCE: 1999



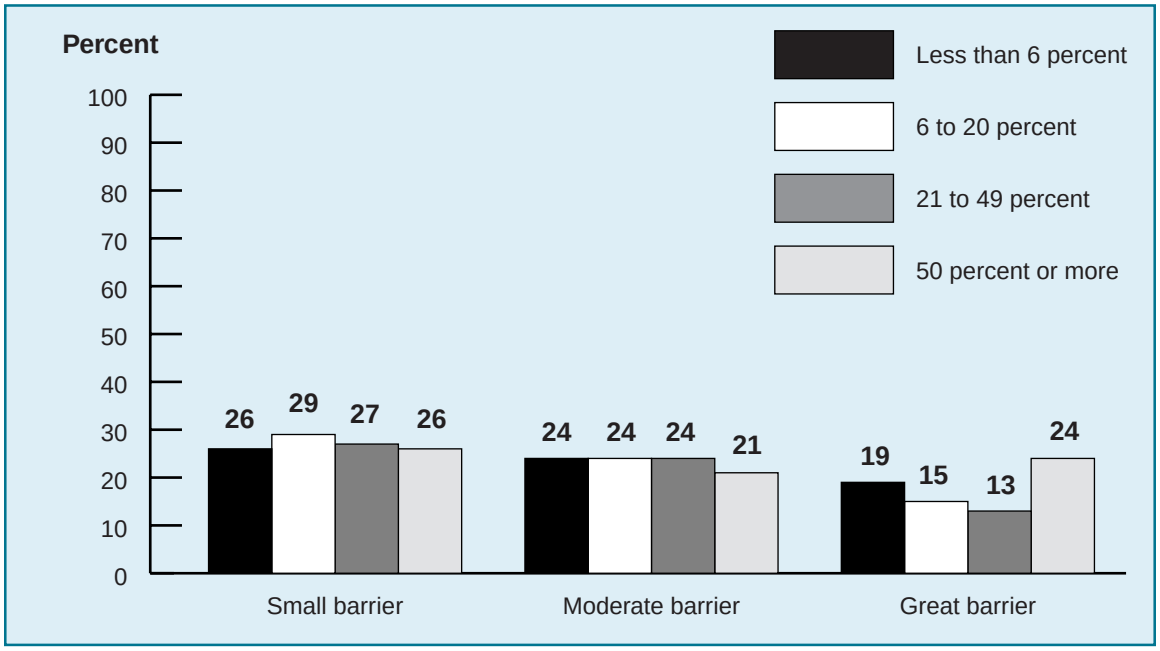
NOTE: Teachers who reported that computers were not available to them anywhere in the school were excluded from the analyses presented in this figure.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

enrollments cited lack of support regarding ways to integrate telecommunications as a great barrier compared with 15 percent of teachers in schools with 6 to 20 percent minority enrollments, and 13 percent of teachers in schools with 21 to 49 percent minority enrollments (figure 6.3)

In addition, teachers in schools that did not have a technical coordinator in 1999 (20 percent—table A-6.3) were approximately two to three times as likely as teachers in schools with a technical coordinator to report the lack of institutional and technical support as a great barrier (figure 6.4). Specifically, 8 percent of teachers in schools with a technical coordinator cited lack of administrative support as a great barrier compared with 17 percent of teachers without this resource. Moreover, 15 percent of teachers with a technical coordinator perceived lack of support regarding ways to integrate technology into the curriculum as a great barrier, compared with 33 percent of teachers without a technology coordinator. Finally, 12 percent of teachers that had a technical coordinator available reported the lack of technical support or advice as a great barrier, compared with 39 percent of teachers without a technology coordinator.

FIGURE 6.3. PERCENT OF PUBLIC SCHOOL TEACHERS REPORTING LACK OF SUPPORT REGARDING WAYS TO INTEGRATE TECHNOLOGY INTO THE CURRICULUM AS A SMALL, MODERATE, OR GREAT BARRIER TO THE USE OF COMPUTERS AND THE INTERNET FOR INSTRUCTION, BY PERCENT MINORITY ENROLLMENT IN SCHOOL: 1999



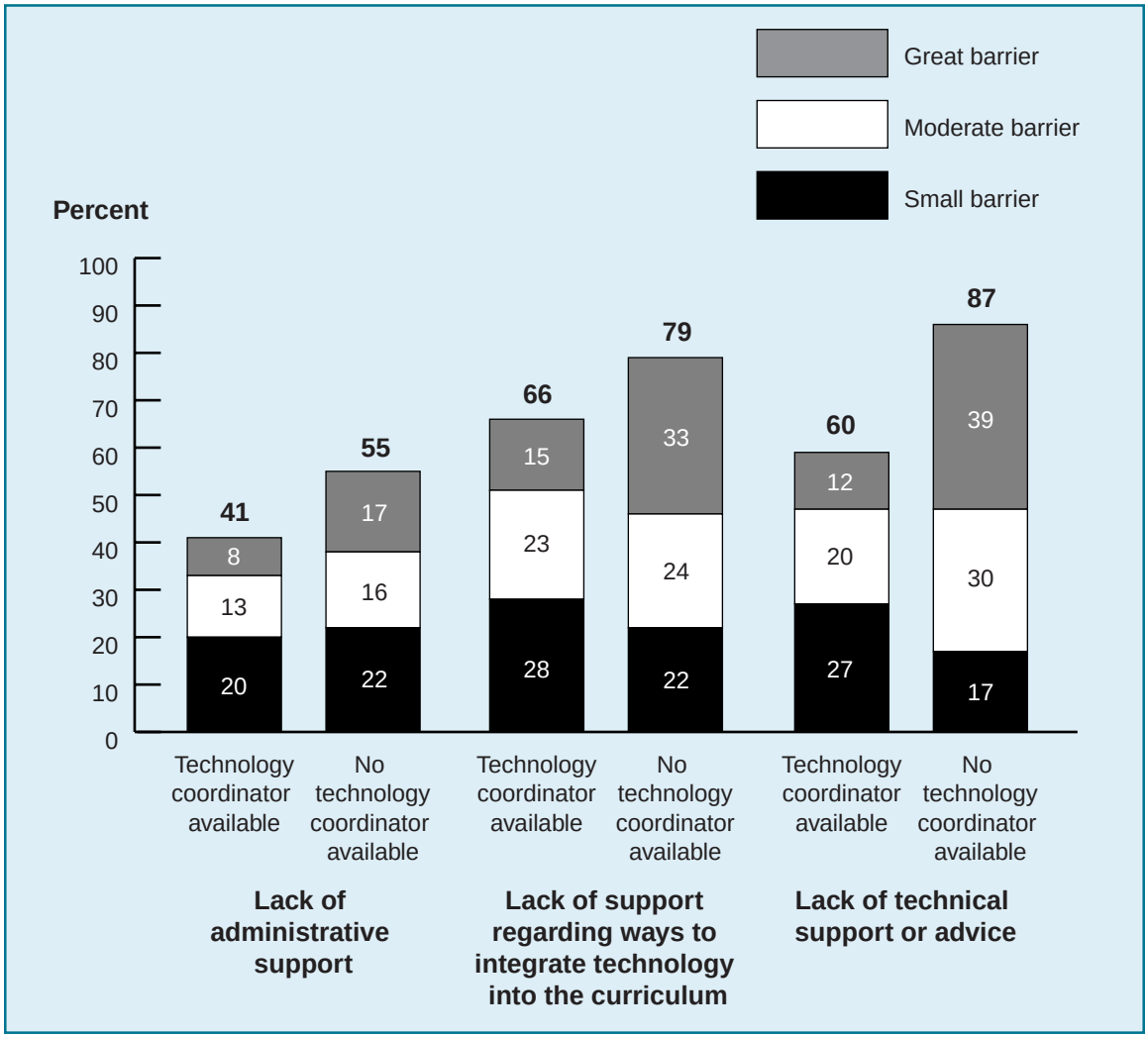
NOTE: Teachers who reported that computers were not available to them anywhere in the school were excluded from the analyses presented in this figure.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Barriers and Teachers' Instructional Activities

Generally, teachers who perceived lacking computers and time for students to use computers as great barriers were less likely than those who did not perceive these conditions as barriers to assign students to use computers or the Internet for some instructional activities. For example, teachers who reported insufficient numbers of computers as a great barrier were less likely than teachers reporting that this was not a barrier to assign students to use computers or the Internet to a "large extent" for practicing drills (9 percent compared with 19 percent), word processing or creating spreadsheets (14 percent compared with 25 percent), and solving problems and analyzing data (6 percent compared with 13 percent—table 6.2). The pattern is similar for an additional barrier, lack of time in schedule for students to use computers in class, with the exception of Internet research—teachers who reported lack of time as a great barrier were less likely to do this than teachers who reported it as a small barrier.

FIGURE 6.4. PERCENT OF PUBLIC SCHOOL TEACHERS REPORTING LACK OF INSTITUTIONAL AND TECHNICAL SUPPORT AS SMALL, MODERATE, OR GREAT BARRIERS TO THE USE OF COMPUTERS AND THE INTERNET FOR INSTRUCTION, BY AVAILABILITY OF A TECHNOLOGY COORDINATOR: 1999



NOTE: Teachers who reported that computers were not available to them anywhere in the school were excluded from the analyses presented in this figure. Detail may not sum to totals due to rounding. First two bars read: 8 percent of teachers in schools with a technical coordinator cited lack of administrative support as a great barrier compared with 17 percent of teachers without this resource.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

TABLE 6.2. PERCENT OF PUBLIC SCHOOL TEACHERS REPORTING USING COMPUTERS OR THE INTERNET FOR VARIOUS ACTIVITIES AT SCHOOL TO A LARGE EXTENT, BY EXTENT TO WHICH THEY PERCEIVED VARIOUS CONDITIONS TO BE BARRIERS TO COMPUTER AND INTERNET USE: 1999

Teachers' reports of barriers	Activities			
	Practice drills	Solve problems/ analyze data	Word processing/ spread-sheets	Internet research
All public school teachers	**12**	**8**	**20**	**12**
Not enough computers				
Not at all	19	13	25	13
Small barrier	13	7	22	13
Moderate barrier	10	7	23	14
Great barrier	9	6	14	9
Lack of time in schedule				
Not at all	18	18	25	12
Small barrier	12	8	25	18
Moderate barrier	12	4	19	10
Great barrier	8	6	15	9

NOTE: Teachers who reported that computers were not available to them anywhere in the school were excluded from the analyses presented in this table.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

CHAPTER 7

Conclusions

Teacher Use of Technology

The research literature on education technology has typically focused on the availability of technology in the nation's public schools and classrooms and reported that the availability has grown substantially. However, there is much less research on whether, how frequently, and in what manner these technologies are being used. The research that does exist suggests that as availability has grown, so has the number of students and teachers using computers and the frequency with which they use them (Levin et al., 1998). According to the literature, however, the advent of computers and the Internet has not dramatically changed how teachers teach and how students learn. Computers have typically been used for traditional methods of teaching (e.g., drill and practice and computer education—Becker, 1983; Becker, 1984); although the more recent data suggest that some teachers are using technology in more innovative ways (e.g., solve problems, conduct research—Becker, 1999; Fulton, 1997).

The most recent data on teachers' technology use, provided by the 1999 FRSS teacher survey, indicate that approximately half of all public school teachers used computers or the Internet for classroom instruction in 1999. And teachers' use of technology can be characterized as reflecting a mixture of traditional and innovative teaching methods. For example, teachers using computers for instruction assigned students to use computers or the Internet for practicing drills and word processing or creating spreadsheets frequently in 1999. However, they also frequently assigned students to use computers and the Internet for research and solving problems and analyzing data.

In addition to classroom instruction, the 1999 survey indicates that teachers also used computers to prepare for instruction and to communicate with others. Specifically, many teachers used computers or the Internet to conduct a number of preparatory and administrative tasks (e.g., creating instructional materials, gathering information for planning lessons) and communicative (e.g., communication with colleagues) tasks. However,

teachers used these technologies less frequently for such tasks as accessing research, best practices examples, and model lesson plans, as well as communicating with parents and students.

Teachers' use of computers or the Internet for instructional purposes was related to their training and preparation and work environments. As described in more detailed below, teachers were more likely to use these technologies when the technologies were available to them, available in their classrooms as opposed to computer labs, and available in greater numbers. Moreover, teachers who reported feeling better prepared were more likely to use these technologies than their less prepared colleagues. (Teachers who spent more time in professional development reported feeling better prepared than their colleagues.) Finally, teachers who perceived lacking computers and time for students to use computers as great barriers were less likely than their colleagues to assign students to use computers or the Internet for some instructional activities.

Teachers' Training and Preparation

Research on teacher training and preparation for technology use often focuses on professional development opportunities or pre-service training. Generally, traditional professional development activities have been criticized for lacking continuity and follow-up (Fullan with Stiegelbauer, 1991), and pre-service training has been criticized as being fragmented and unconnected to real classroom experiences (NCTAF, 1996). Despite these criticisms, 88 percent of teachers indicated that professional development activities prepared them to some extent to use technology, and 84 percent of teachers with 3 or fewer years of teaching experience indicated that college/graduate work prepared them to some extent to use technology. However, a relatively small proportion of teachers indicated that these sources prepared them to a "large extent."

Results presented in this report also indicate that professional development and teachers' feelings of preparation are related. Specifically, teachers who spent more time in professional development activities on technology use indicated that they felt better prepared to use technology for classroom instruction than those who spent less time in these activities. Furthermore, teachers who reported that they felt better prepared to use technology were more likely to use it than teachers who reported feeling less prepared. However, these findings are descriptive and not causal in nature. For example, results presented in this paragraph may suggest that if teachers spend more time in professional development activities, their feeling of preparedness will increase. On the other hand, these findings may also suggest that teachers who feel more prepared to use technology tend to seek out more opportunities to learn about this topic.

Teachers' Work Environment

As described in the introductory chapter, teachers' ability and willingness to use computers and the Internet may depend, to some extent, on the schools and classrooms in which they work. On the most basic level, for example, teachers may be more likely to integrate computers and the Internet into classroom instruction if they have access to adequate equipment and connections and if they have time to learn about these technologies and use them in their classrooms.

With respect to the availability of and access to technology, the findings presented in this report indicate that both have grown dramatically over the past decade. A majority of classrooms have at least one computer, many of these computers have Internet connections, and a large number of teachers and students have these technologies available at home as well. In addition, nearly all teachers with such technology available to them used the computers and the Internet connections in their schools, and most reported that their students used computers and the Internet in the school as well.

Despite high levels of availability and use, however, many teachers reported facing a number of barriers to the use of technology in their schools. The barriers to the use of computer and the Internet for instruction most frequently reported by public school teachers were insufficient numbers of computers, lack of release time for teachers to learn how to use computers or the Internet, and lack of time in schedule for students to use computers in class. In fact, while it is true that most schools now have computers and the Internet available somewhere in their schools, this availability is still somewhat limited in the classroom; among teachers who reported having any computers in their classrooms, it was most common to have one computer. With one classroom computer, teachers may have the technology they need to prepare for lessons and use computers for demonstrative purposes during classroom instruction; however, it may be difficult to have students use computers under these conditions. Indeed, teachers who did not use computers or the Internet were more likely to report insufficient numbers of computers and lack of time as great barriers than teachers who used these technologies. Additionally, teachers with more computers in their classrooms generally used technology for instructional purposes more frequently. These findings are descriptive and not causal. For example, teachers may be more inclined to use computers once they are placed in their classrooms. On the other hand, teachers who are more inclined to use computers may actively seek to acquire them for their classrooms.

Teacher and School Characteristics

Years of Teaching Experience

As discussed in the introductory chapter of this report, there are a number of factors that contribute to the success or failure of instructional reforms, including the use of technology for classroom instruction. One important factor is that teachers do not always have opportunities to learn about and practice instructional reforms. One way prospective teachers learn how to use computers is through their teacher preparation programs. And although some observers have argued that prospective teachers are not getting the training they need to successfully integrate technology into classroom instruction (President's Committee of Advisors on Science and Technology, 1997), recent graduates of teacher preparation programs are more likely to have received some instruction in technology use than teachers who graduated one or two decades ago. In fact, teachers with fewer years of teaching experience were more likely than their more experienced colleagues to indicate that college/graduate work prepared them to use computers and the Internet. Indeed, less experienced teachers used technology (e.g., e-mail, the

Internet, computers) more frequently than their more experienced colleagues for a variety of purposes (e.g., to gather information for planning lessons, create instructional materials, access research, best practices examples, model lesson plans).

On the other hand, practicing teachers often learn from professional development activities, and may be more likely to learn about technology from such activities. As findings presented in this report indicate, more experienced teachers were more likely than their less experienced colleagues to take advantage of the professional development activities on technology use that were available to them. Despite their higher participation in professional development, however, more experienced teachers were less likely than less experienced teachers to indicate that they felt "well prepared" or "very well prepared" to use technology for classroom instruction.

Minority Enrollment and Poverty Concentration

Among teachers with technology available in their schools, teachers in low minority schools (less than 6 percent) and lower poverty schools (less than 11 percent) were generally more likely than teachers in higher minority schools (50 percent or more minority enrollments) and higher poverty schools (50 to 70 percent or 71 percent or more students eligible for free or reduced-price lunch) to use computers or the Internet at school for a wide range of activities, including creating instructional materials, communicating with colleagues, and instructing students. Features of these schools may provide a context for understanding these findings. For example, teachers in high minority schools were less likely than those in some lower minority schools to have computers (77 percent of teachers in schools with minority enrollments of 50 percent or more compared with 89 percent of teachers in schools with minority enrollments of 21 to 49 percent) or the Internet (69 percent of teachers in schools with minority enrollments of less than 6 percent and 71 percent of teachers in schools with minority enrollments of 6 to 20 percent compared with 51 percent of teachers in schools with minority enrollments of 50 percent or more) in their classrooms.

Furthermore, teachers in high minority schools were generally more likely than teachers in low minority schools to cite a number of barriers to technology use, including outdated, incompatible, or unreliable computers, easy Internet access, and the lack of support regarding ways to integrate telecommunications. In addition, teachers in high poverty schools generally had fewer computers with Internet connections available in their classrooms or elsewhere in the school than teachers in lower poverty schools. Moreover, teachers in high poverty and high minority schools generally were less likely to report that training in Internet use was available to them.

Instructional Level

There were a number of differences between elementary and secondary teachers in their use of technology. For example, elementary teachers were more likely than secondary teachers to use technology for classroom instruction and to communicate with parents. In addition, elementary teachers were more likely than secondary teachers to assign students to use computers or the Internet to practice drills and to solve problems and analyze data. On the other hand, secondary

teachers were more likely than elementary teachers to use computers or the Internet for administrative record keeping, to communicate with students, and to assign students to use these technologies to conduct Internet research. Furthermore, elementary teachers were more likely than secondary teachers to assign projects using the computer *inside* the classroom, whereas, secondary teachers were more likely than elementary teachers to assign projects using the computer *outside* of the classroom. Elementary teachers were also more likely than secondary teachers to report that their students used computers at school; however, secondary teachers were more likely than elementary teachers to report that their students used the Internet at school.

Features of elementary and secondary teachers' schools may provide a context for these differences. For example, secondary teachers may have reported that their students used computers inside the classroom less often than elementary teachers because secondary teachers were less likely to have computers in their classrooms and had fewer classroom computers than elementary teachers. In fact, secondary teachers were more likely than elementary teachers to indicate that insufficient numbers of computers was a great barrier to use of computers or the Internet for instruction. On the other hand, secondary teachers may have reported that their students used the Internet more often than elementary teachers because secondary teachers were more likely than elementary teachers to have the Internet available on the computers that they did have in their classrooms, and they were also more likely to have Internet availability elsewhere in the school. In fact, elementary teachers cited not having easy Internet access as a barrier more frequently than secondary teachers.

New Directions

Although the findings presented in this report provide important information about a topic—teachers' use of advanced education technology—that has not been well documented previously, they do not address many emerging policy issues, including the following policy questions:

- How does the use of computers, the Internet and other applications by teachers and students affect student performance, knowledge, and skills?
- What is the impact of computer and Internet use on the way teachers teach and students learn, and what is the impact, more broadly, on educational reform?
- How does the investment in technology compare with other educational innovations, such as smaller classes or individualized instruction, in terms of costs and benefits?

In addition to the questions listed above, fruitful topics for future research include the following:

- updated information on the types of technologies that are available in schools (e.g., quality/speed, types of Internet connections, software applications);

- organizational changes to schools that will enable the increased use of technology (e.g., administrative efficiency, home-school connections, collegial communication) or the sustainability of technology implementation and use;
- fiscal expenditures on educational technology at the school, district, state, and especially national levels;
- professional development and technical support strategies for enhancing teachers' effective use of technology;
- in-depth understanding of the duration and types of technology uses for teaching and learning both inside and outside of the school (e.g., subject specific uses);
- the effects of different types of technology applications on particular types of students (e.g., limited English proficient, special education, gifted and talented).

New NCES Data Sources for Education Technology Issues

Throughout 1999 and 2000, a number of NCES surveys were collecting a wide range of information on the use of education technology. These data may fill in some of the gaps in the educational technology literature and may provide more detail on topics addressed in the 1999 FRSS teacher survey. For example, the 2000 FRSS school technology survey will provide the most recent data on the availability of computers and the Internet in public schools. Furthermore, the 1999-2000 Schools and Staffing Survey (SASS), an extensive survey with a large sample of public, private, Bureau of Indian Affairs, and charter schools and detailed information on teachers' characteristics and practices, includes a number of questions about technology. For example, SASS collected data in areas such as expenditures on computer hardware, the types of technology available in media centers, and school staffing for both technical support and the integration of technology into the classroom for teaching and learning in 1999-2000.

The 2001 National Assessment of Educational Progress (NAEP) will be collecting detailed data in a number of new areas: the age and quality of school computers, schools' participation in community programs and grant programs such as the E-rate, details of schools' technology plans, and student perceptions of their own technology skills. NAEP 2001 items also cover subject-specific student uses of technology, student attitudes about technology, and teacher ratings of availability of technology, quality of technical support, and usefulness of computers in the classroom.

Finally, the Early Childhood Longitudinal Study (ECLS) collected data on technology at the kindergarten level. ECLS 1998-99 items inquired about the number of computers in schools, the perceived adequacy and physical condition of computer labs, the presence of technology in classrooms, and kindergarten students' use of technology. The ECLS will collect longitudinal data on student achievement and teacher practices, which may be used to link these measures to various items related to technology.

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Appendix A

Standard Error Tables for Text Tables and Figures

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Standard Error Tables for Text Tables and Figures

Table A-2.1a.—Standard errors of the percent of public school teachers who have computers at school or at home reporting using computers or the Internet a little or a lot at school and at home for various activities, by school and teacher characteristics: 1999

School and teacher characteristics	Activities					
	Create instructional materials		Gather information for lesson plans		Administrative record keeping	
	At school	At home	At school	At home	At school	At home
All public school teachers	**1.13**	**0.98**	**1.41**	**1.37**	**1.48**	**1.56**
Instructional level						
Elementary	1.49	1.26	1.86	1.84	1.98	2.10
Secondary	1.69	1.59	2.04	1.94	2.03	2.19
Enrollment size						
Less than 300	3.18	3.44	3.49	4.11	4.20	4.21
300 to 999	1.37	1.20	1.82	1.75	1.84	1.95
1,000 or more	2.50	1.90	2.69	2.57	3.00	3.27
Locale						
City	2.19	2.04	2.61	2.77	2.88	3.06
Urban fringe	1.92	1.47	2.38	2.16	2.50	2.52
Town	2.74	2.18	3.35	3.12	3.31	4.09
Rural	2.28	2.44	3.17	3.29	3.21	3.34
Percent minority enrollment in school						
Less than 6 percent	2.13	1.83	2.66	2.50	2.75	2.72
6 to 20 percent	2.18	1.88	2.76	3.04	3.08	3.53
21 to 49 percent	2.13	1.84	2.76	2.65	2.86	3.34
50 percent or more	2.52	2.24	2.84	2.90	3.12	3.09
Percent of students in school eligible for free or reduced-price school lunch						
Less than 11 percent	2.22	2.39	3.48	3.60	4.11	4.32
11 to 30 percent	1.87	1.62	2.43	2.34	2.63	2.91
31 to 49 percent	2.66	2.00	3.15	3.27	3.29	3.61
50 to 70 percent	3.05	2.76	3.70	3.55	3.76	3.66
71 percent or more	3.30	2.80	3.81	3.54	4.10	4.10
Teaching experience						
3 or fewer years	3.16	2.28	3.80	3.56	3.87	4.11
4 to 9 years	2.16	2.12	2.81	2.81	3.00	3.21
10 to 19 years	2.01	1.87	2.54	2.77	2.57	2.93
20 or more years	1.82	1.72	2.18	2.19	2.22	2.39

See note at end of table.

Table A-2.1a.—Standard errors of the percent of public school teachers who have computers at school or at home reporting using computers or the Internet a little or a lot at school and at home for various activities, by school and teacher characteristics: 1999—Continued

School and teacher characteristics	Activities					
	Access research and best practice examples		Multimedia presentations		Access model lesson plans	
	At school	At home	At school	At home	At school	At home
All public school teachers	**1.34**	**1.47**	**1.35**	**1.46**	**1.30**	**1.49**
Instructional level						
Elementary	1.78	1.98	1.81	1.98	1.73	2.01
Secondary	1.92	2.05	1.88	2.03	1.92	2.00
Enrollment size						
Less than 300	3.76	4.35	3.75	3.78	3.76	4.30
300 to 999	1.75	1.87	1.76	1.83	1.66	1.91
1,000 or more	2.27	2.82	2.35	3.03	2.41	2.76
Locale						
City	2.53	2.88	2.56	2.80	2.50	2.88
Urban fringe	2.10	2.43	2.34	2.49	2.08	2.53
Town	3.83	3.47	2.91	3.44	3.18	3.39
Rural	3.03	3.19	2.96	3.04	3.06	3.27
Percent minority enrollment in school						
Less than 6 percent	2.64	2.68	2.66	2.89	2.42	2.51
6 to 20 percent	2.64	3.03	2.97	2.99	2.69	3.21
21 to 49 percent	2.60	3.12	2.42	3.00	2.67	3.24
50 percent or more	2.82	2.98	2.70	2.83	2.67	2.99
Percent of students in school eligible for free or reduced-price school lunch						
Less than 11 percent	3.34	3.70	3.46	3.99	2.97	4.02
11 to 30 percent	2.42	2.54	2.59	2.69	2.38	2.69
31 to 49 percent	3.08	3.56	2.76	3.04	3.15	3.11
50 to 70 percent	3.06	3.95	3.27	4.03	3.01	3.98
71 percent or more	3.85	3.64	3.79	3.49	3.69	3.76
Teaching experience						
3 or fewer years	3.65	4.15	3.61	3.86	3.57	4.07
4 to 9 years	2.77	3.02	2.87	3.12	2.70	3.11
10 to 19 years	2.49	2.83	2.50	2.68	2.42	2.87
20 or more years	2.03	2.28	1.95	2.18	1.93	2.21

NOTE: Teachers who reported that computers were not available to them anywhere in the school were excluded from the “At school” analyses presented in this table. Teachers who reported not having a computer available at home were excluded from the “At home” analyses presented in this table.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Table A-2.2a.—Standard errors of the percent of public school teachers who have computers at school or at home reporting using computers or the Internet a little or a lot at school and at home, for various activities, by school and teacher characteristics: 1999

School and teacher characteristics	Activities			
	Communicate with colleagues		Communicate with parents	
	At school	At home	At school	At home
All public school teachers	**1.70**	**1.43**	**1.35**	**1.12**
Instructional level				
Elementary	2.29	1.92	1.82	1.55
Secondary	2.33	1.98	1.86	1.40
Enrollment size				
Less than 300	4.05	4.35	3.44	3.41
300 to 999	2.13	1.83	1.72	1.44
1,000 or more	3.61	2.56	2.71	2.05
Locale				
City	3.10	2.66	2.42	2.07
Urban fringe	3.03	2.47	2.36	1.95
Town	3.67	3.57	3.48	2.58
Rural	3.61	2.82	2.76	2.51
Percent minority enrollment in school				
Less than 6 percent	3.09	2.87	2.64	2.19
6 to 20 percent	3.30	3.02	3.18	2.33
21 to 49 percent	3.72	2.86	2.75	2.32
50 percent or more	3.21	2.66	1.90	2.17
Percent of students in school eligible for free or reduced-price school lunch				
Less than 11 percent	4.37	3.51	3.55	2.77
11 to 30 percent	3.09	2.51	2.63	2.08
31 to 49 percent	3.96	3.41	3.38	2.50
50 to 70 percent	3.99	3.75	3.02	3.20
71 percent or more	3.99	3.53	2.77	2.68
Teaching experience				
3 or fewer years	3.77	4.07	2.81	3.04
4 to 9 years	3.06	3.09	2.43	2.52
10 to 19 years	2.74	2.78	2.33	2.13
20 or more years	2.33	2.30	2.04	1.74

See note at end of table.

Table A-2.2a.—Standard errors of the percent of public school teachers who have computers at school or at home reporting using computers or the Internet a little or a lot at school and at home, for various activities, by school and teacher characteristics: 1999—Continued

School and teacher characteristics	Activities			
	Post homework/ assignments		Communicate with students	
	At school	At home	At school	At home
All public school teachers	**0.99**	**0.99**	**0.84**	**1.00**
Instructional level				
Elementary	1.29	1.32	1.06	1.30
Secondary	1.58	1.42	1.43	1.61
Enrollment size				
Less than 300	2.26	2.16	1.92	2.69
300 to 999	1.26	1.21	1.09	1.25
1,000 or more	2.02	2.16	1.65	2.11
Locale				
City	1.97	2.03	1.59	1.78
Urban fringe	1.54	1.56	1.37	1.79
Town	2.73	2.78	2.19	2.24
Rural	2.21	2.02	1.89	2.19
Percent minority enrollment in school				
Less than 6 percent	1.97	1.83	1.68	1.81
6 to 20 percent	1.92	1.69	1.95	2.29
21 to 49 percent	2.01	1.93	1.72	2.06
50 percent or more	2.08	2.44	1.38	1.87
Percent of students in school eligible for free or reduced-price school lunch				
Less than 11 percent	2.26	2.15	1.99	2.26
11 to 30 percent	1.61	1.68	1.75	1.99
31 to 49 percent	2.50	2.27	2.10	2.32
50 to 70 percent	2.52	2.72	1.78	2.45
71 percent or more	2.95	3.27	1.88	2.27
Teaching experience				
3 or fewer years	2.76	2.93	2.22	2.64
4 to 9 years	2.11	2.12	1.82	2.34
10 to 19 years	2.06	1.72	1.57	1.88
20 or more years	1.52	1.53	1.29	1.46

NOTE: Teachers who reported that computers were not available to them anywhere in the school were excluded from the “At school” analyses presented in this table. Teachers who reported not having a computer available at home were excluded from the “At home” analyses presented in this table.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Table A-2.3a.—Standard errors of the percent of public school teachers who have computers at school reporting use of computers or the Internet for instruction during class time, by school and teacher characteristics: 1999

School and teacher characteristics	Percent
All public school teachers	**1.36**
Instructional level	
Elementary	1.83
Secondary	1.94
Enrollment size	
Less than 300	3.96
300 to 999	1.74
1,000 or more	2.51
Locale	
City	2.77
Urban fringe	2.25
Town	2.93
Rural	3.16
Percent minority enrollment in school	
Less than 6 percent	2.58
6 to 20 percent	2.72
21 to 49 percent	2.89
50 percent or more	2.87
Percent of students in school eligible for free or reduced-price school lunch	
Less than 11 percent	3.23
11 to 30 percent	2.67
31 to 49 percent	2.87
50 to 70 percent	3.25
71 percent or more	4.00
Teaching experience	
3 or fewer years	3.51
4 to 9 years	2.78
10 to 19 years	2.69
20 or more years	2.04

NOTE: Teachers who reported that computers were not available to them anywhere in the school were excluded from the analyses presented in this table.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Table A-2.4a.—Standard errors of the percent of public school teachers who have computers at school assigning students to do various activities with computers or the Internet to any extent, by school and teacher characteristics: 1999

School and teacher characteristics	Activities				
	Word processing/ spreadsheets	Internet research	Drills	Solve problems/ analyze data	CD-ROM research
All public school teachers	**1.40**	**1.51**	**1.40**	**1.41**	**1.51**
Instructional level					
Elementary	1.90	2.08	1.88	1.88	2.06
Secondary	1.89	1.99	1.80	2.02	1.98
Enrollment size					
Less than 300	3.66	3.80	3.66	3.80	3.71
300 to 999	1.78	1.95	1.81	1.80	1.92
1,000 or more	2.78	2.97	2.42	2.74	3.08
Locale					
City	2.65	2.85	2.69	2.66	2.79
Urban fringe	2.30	2.56	2.47	2.32	2.45
Town	3.20	3.50	3.82	3.75	3.83
Rural	3.27	3.61	3.23	3.22	3.50
Percent minority enrollment in school					
Less than 6 percent	2.45	2.91	2.61	2.62	2.81
6 to 20 percent	3.15	3.03	2.89	2.90	2.79
21 to 49 percent	2.90	3.17	3.24	2.96	3.19
50 percent or more	2.67	3.05	3.07	2.95	3.12
Percent of students in school eligible for free or reduced-price school lunch					
Less than 11 percent	3.82	4.31	3.74	3.42	3.67
11 to 30 percent	2.56	2.73	2.66	2.65	2.84
31 to 49 percent	3.17	3.46	3.29	3.17	3.11
50 to 70 percent	3.47	3.48	3.90	3.84	4.06
71 percent or more	3.40	3.79	3.85	3.65	3.88
Teaching experience					
3 or fewer years	3.77	3.94	3.95	3.77	3.86
4 to 9 years	2.77	3.12	2.92	2.83	2.98
10 to 19 years	2.75	2.75	2.70	2.75	2.73
20 or more years	2.14	2.25	2.14	2.22	2.36

See note at end of table.

Table A-2.4a.—Standard errors of the percent of public school teachers who have computers at school assigning students to do various activities with computers or the Internet to any extent, by school and teacher characteristics: 1999—Continued

School and teacher characteristics	Activities			
	Multimedia projects	Graphical presentations	Demonstrations/ simulations	Correspondence with experts
All public school teachers	**1.51**	**1.48**	**1.47**	**1.24**
Instructional level				
Elementary	2.07	2.01	2.00	1.67
Secondary	1.97	2.00	1.94	1.74
Enrollment size				
Less than 300	3.38	3.62	3.62	3.30
300 to 999	1.94	1.88	1.88	1.56
1,000 or more	3.09	3.11	2.96	2.55
Locale				
City	2.82	2.72	2.71	2.28
Urban fringe	2.54	2.47	2.53	2.10
Town	3.91	3.75	3.70	2.98
Rural	3.18	3.38	2.96	2.83
Percent minority enrollment in school				
Less than 6 percent	2.73	2.80	2.48	2.54
6 to 20 percent	3.20	3.09	3.15	2.61
21 to 49 percent	3.15	3.11	3.18	2.49
50 percent or more	2.91	2.85	2.94	2.10
Percent of students in school eligible for free or reduced-price school lunch				
Less than 11 percent	4.10	3.96	3.95	3.83
11 to 30 percent	2.90	2.63	2.63	2.27
31 to 49 percent	3.17	3.35	3.40	2.49
50 to 70 percent	3.94	4.25	4.05	2.99
71 percent or more	3.72	3.66	3.83	2.74
Teaching experience				
3 or fewer years	4.06	3.84	3.92	3.07
4 to 9 years	2.97	2.93	3.12	2.60
10 to 19 years	2.71	2.79	2.70	2.40
20 or more years	2.31	2.22	2.16	1.86

NOTE: Teachers who reported that computers were not available to them anywhere in the school were excluded from the analyses presented in this table.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Table A-2.5.—Standard errors for the figures and for data not shown in tables in chapter 2: FRSS 1999 and NAEP 1992, 1994, 1996, 1998

Item	Estimate	Standard error
Figure 2.1: Percent of 4th- and 8th- grade public school students who have teachers reporting student use of computers for various class activities: 1998		
Write drafts: 4th-grade	61	2.65
Write drafts: 8th-grade	62	2.74
Read stories: 4th-grade	52	2.10
Read stories: 8th-grade	41	2.47
Practice spelling, punctuation, and grammar: 4th-grade	50	2.11
Practice spelling, punctuation, and grammar: 8th-grade	33	2.36
Figure 2.2: Percent of 8th- grade public school students who have teachers reporting student use of computers to write drafts and practice spelling, punctuation, and grammar: 1992 and 1998		
Write drafts: 1992	35	3.13
Write drafts: 1998	63	2.32
Practice spelling, punctuation, and grammar: 1992	15	1.99
Practice spelling, punctuation, and grammar: 1998	32	1.86
Figure 2.3: Percent of public school teachers who have computers at school or at home reporting using computers or the Internet a little or a lot at school and at home, for various tasks: 1999		
Create instructional materials: at school: a little	39	1.28
Create instructional materials: at school: a lot	39	1.35
Create instructional materials: at school: to any extent	78	1.13
Create instructional materials: at home: a little	36	1.37
Create instructional materials: at home: a lot	50	1.42
Create instructional materials: at home: to any extent	85	0.98
Gather information for lesson plans: at school: a little	43	1.35
Gather information for lesson plans: at school: a lot	16	0.93
Gather information for lesson plans: at school: to any extent	59	1.41
Gather information for lesson plans: at home: a little	38	1.38
Gather information for lesson plans: at home: a lot	29	1.29
Gather information for lesson plans: at home: to any extent	67	1.37
Administrative record keeping: at school: a little	16	0.99
Administrative record keeping: at school: a lot	34	1.39
Administrative record keeping: at school: to any extent	51	1.48
Administrative record keeping: at home: a little	18	1.11
Administrative record keeping: at home: a lot	26	1.32
Administrative record keeping: at home: to any extent	44	1.56
Access best practice examples: at school: a little	30	1.24
Access best practice examples: at school: a lot	7	0.66
Access best practice examples: at school: to any extent	37	1.34
Access best practice examples: at home: a little	33	1.36
Access best practice examples: at home: a lot	14	0.97
Access best practice examples: at home: to any extent	46	1.47
Multimedia presentations: at school: a little	28	1.18
Multimedia presentations: at school: a lot	8	0.75
Multimedia presentations: at school: to any extent	36	1.35
Multimedia presentations: at home: a little	23	1.36
Multimedia presentations: at home: a lot	8	0.76
Multimedia presentations: at home: to any extent	30	1.46
Access model lesson plans: at school: a little	28	1.23
Access model lesson plans: at school: a lot	6	0.62
Access model lesson plans: at school: to any extent	34	1.30
Access model lesson plans: at home: a little	29	1.35
Access model lesson plans: at home: a lot	13	1.03
Access model lesson plans: at home: to any extent	42	1.49

Table A-2.5.—Standard errors for the figures and for data not shown in tables in chapter 2: FRSS 1999 and NAEP 1992, 1994, 1996, 1998—Continued

Item	Estimate	Standard error
Figure 2.4: Percent of public school teachers who have computers at school or at home reporting using computers or the Internet a little or a lot at school and at home, for various tasks: 1999		
Communicate with colleagues: at school: a little	27	1.28
Communicate with colleagues: at school: a lot	23	1.39
Communicate with colleagues: at school: to any extent	50	1.70
Communicate with colleagues: at home: a little	32	1.32
Communicate with colleagues: at home: a lot	16	1.03
Communicate with colleagues: at home: to any extent	48	1.43
Communicate with parents: at school: a little	18	1.16
Communicate with parents: at school: a lot	7	0.69
Communicate with parents: at school: to any extent	25	1.35
Communicate with parents: at home: a little	13	0.95
Communicate with parents: at home: a lot	6	0.68
Communicate with parents: at home: to any extent	19	1.12
Post homework/assignments: at school: a little	12	0.85
Post homework/assignments: at school: a lot	5	0.58
Post homework/assignments: at school: to any extent	17	0.99
Post homework/assignments: at home: a little	8	0.81
Post homework/assignments: at home: a lot	5	0.62
Post homework/assignments: at home: to any extent	13	0.99
Communicate with students: at school: a little	10	0.80
Communicate with students: at school: a lot	2	0.29
Communicate with students: at school: to any extent	12	0.84
Communicate with students: at home: a little	12	0.92
Communicate with students: at home: a lot	3	0.47
Communicate with students: at home: to any extent	14	1.00
Figure 2.5: Percent of public school teachers who have computers at school reporting assigning projects using computers, inside and outside the classroom, by instructional level: 1999		
All public school teachers: inside classroom	53	1.45
All public school teachers: outside classroom	48	1.39
Instructional level: elementary: inside classroom	60	1.98
Instructional level: elementary: outside classroom	41	1.84
Instructional level: secondary: inside classroom	37	1.82
Instructional level: secondary: outside classroom	64	1.89
Figure 2.6: Percent of public school teachers who have computers at school assigning students different types of work using computers or the Internet to a small, moderate, or large extent: 1999		
Word processing/spreadsheets: small extent	20	1.11
Word processing/spreadsheets: moderate extent	21	1.16
Word processing/spreadsheets: large extent	20	1.09
Word processing/spreadsheets: to any extent	61	1.40
Internet research: small extent	21	1.12
Internet research: moderate extent	19	1.07
Internet research: large extent	12	0.84
Internet research: to any extent	51	1.51
Solve problems/analyze data: small extent	23	1.21
Solve problems/analyze data: moderate extent	19	1.11
Solve problems/analyze data: large extent	8	0.75
Solve problems/analyze data: to any extent	50	1.41
Drills: small extent	19	1.09
Drills: moderate extent	19	1.07
Drills: large extent	12	0.96
Drills: to any extent	50	1.40

Table A-2.5.—Standard errors for the figures and for data not shown in tables in chapter 2: FRSS 1999 and NAEP 1992, 1994, 1996, 1998—Continued

Item	Estimate	Standard error
CD-ROM research: small extent	21	1.12
CD-ROM research: moderate extent	18	1.03
CD-ROM research: large extent	9	0.76
CD-ROM research: to any extent	48	1.51
Multimedia projects: small extent	21	1.14
Multimedia projects: moderate extent	16	1.03
Multimedia projects: large extent	7	0.73
Multimedia projects: to any extent	45	1.51
Graphical presentations: small extent	24	1.21
Graphical presentations: moderate extent	13	0.89
Graphical presentations: large extent	6	0.66
Graphical presentations: to any extent	43	1.48
Demonstrations/simulations: small extent	22	1.19
Demonstrations/simulations: moderate extent	11	0.87
Demonstrations/simulations: large extent	5	0.60
Demonstrations/simulations: to any extent	39	1.47
Correspondence with experts: small extent	16	1.05
Correspondence with experts: moderate extent	5	0.60
Correspondence with experts: large extent	2	0.40
Correspondence with experts: to any extent	23	1.24
Chapter 2, section on computer use for reading and writing instruction		
Percent of 12th- grade public school students in 1998 who used computers to write drafts/final versions of papers	77	0.69
Percent of 12th- grade public school students in 1998 who used computers to practice spelling, punctuation, and grammar	45	0.55
Percent of 12th- grade public school students in 1998 who used computers to write in a log or journal	27	0.68
Chapter 2, section on technology use in schools and classrooms: findings from FRSS		
Percent of public school teachers in 1999 who had computers in their schools	99	0.19
Percent of public school teachers in 1999 who had computers at home	82	1.01

SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999; National Assessment of Educational Progress (NAEP), 1994 and 1998 Reading Assessments, 1996 Math Assessments, 1996 Science Assessments, 1992 and 1998 Writing Assessments.

Table A-3.1a.—Standard errors of the percent of public school teachers reporting computer availability in the classroom and elsewhere in school, by school characteristics: 1999

School characteristics	Computers available in classroom		Computers available elsewhere in school	
	Yes	No	Yes	No
All public school teachers	**1.07**	**1.07**	**0.66**	**0.66**
Instructional level				
Elementary	1.28	1.28	0.96	0.96
Secondary	2.00	2.00	0.42	0.42
Enrollment size				
Less than 300	2.60	2.60	2.83	2.83
300 to 999	1.14	1.14	0.82	0.82
1,000 or more	3.03	3.03	0.88	0.88
Locale				
City	2.43	2.43	1.18	1.18
Urban fringe	1.82	1.82	1.09	1.09
Town	1.70	1.70	2.21	2.21
Rural	2.12	2.12	1.13	1.13
Percent minority enrollment in school				
Less than 6 percent	1.90	1.90	1.46	1.46
6 to 20 percent	2.32	2.32	1.33	1.33
21 to 49 percent	1.69	1.69	1.30	1.30
50 percent or more	2.75	2.75	1.21	1.21

SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Table A-3.2a.—Standard errors of the percent of public school teachers reporting varying numbers of computers available in the classroom, by school characteristics: 1999

School characteristics	Number of computers available in the classroom			
	None	One	2-5	More than 5
All public school teachers	**1.09**	**1.51**	**1.49**	**0.85**
Instructional level				
Elementary	1.31	1.95	2.00	1.09
Secondary	1.98	2.16	1.64	1.11
Enrollment size				
Less than 300	2.58	3.59	3.63	2.44
300 to 999	1.14	1.87	1.94	1.03
1,000 or more	3.09	2.99	2.38	1.53
Locale				
City	2.42	2.78	2.87	1.48
Urban fringe	1.87	2.40	2.46	1.37
Town	1.69	3.88	3.82	2.05
Rural	2.12	3.24	3.34	1.86
Percent minority enrollment in school				
Less than 6 percent	2.02	2.65	2.88	1.48
6 to 20 percent	2.30	3.11	3.13	1.72
21 to 49 percent	1.68	3.16	3.06	1.62
50 percent or more	2.75	2.95	3.06	1.66
Percent of students in school eligible for free or reduced-price school lunch				
Less than 11 percent	2.71	3.72	3.77	1.71
11 to 30 percent	2.13	2.68	2.68	1.56
31 to 49 percent	2.42	3.20	3.27	1.73
50 to 70 percent	2.36	4.08	4.17	2.28
71 percent or more	2.90	3.69	4.03	2.28

SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Table A-3.3a.—Standard errors of the percent of public school teachers reporting Internet availability in the classroom and elsewhere in school, by school characteristics: 1999

School characteristics	Internet available in classroom		Internet available elsewhere in school	
	Yes	No	Yes	No
All public school teachers	**1.86**	**1.86**	**1.14**	**1.14**
Instructional level				
Elementary	2.38	2.38	1.62	1.62
Secondary	2.38	2.38	0.74	0.74
Enrollment size				
Less than 300	4.57	4.57	2.15	2.15
300 to 999	2.33	2.33	1.45	1.45
1,000 or more	3.38	3.38	2.11	2.11
Locale				
City	3.63	3.63	1.86	1.86
Urban fringe	2.99	2.99	2.21	2.21
Town	4.38	4.38	1.29	1.29
Rural	4.05	4.05	2.26	2.26
Percent minority enrollment in school				
Less than 6 percent	3.50	3.50	2.13	2.13
6 to 20 percent	3.52	3.52	1.96	1.96
21 to 49 percent	3.42	3.42	1.83	1.83
50 percent or more	4.03	4.03	2.70	2.70
Percent of students in school eligible for free or reduced-price school lunch				
Less than 11 percent	4.42	4.42	2.39	2.39
11 to 30 percent	3.32	3.32	1.61	1.61
31 to 49 percent	3.74	3.74	2.22	2.22
50 to 70 percent	4.38	4.38	3.57	3.57
71 percent or more	5.09	5.09	3.61	3.61

NOTE: Teachers who reported that computers were not available to them in the classroom were excluded from the “Internet available in classroom” analyses presented in this table. Teachers who reported that computers were not available to them elsewhere in the school were excluded from the "Internet available elsewhere in school" analyses presented in this table.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Table A-3.4a.—Standard errors of the percent of public school teachers reporting varying numbers of computers in the classroom with Internet connections, by school characteristics: 1999

School characteristics	Number of computers in the classroom with Internet			
	None	One	2-5	More than 5
All public school teachers	**1.86**	**1.83**	**1.28**	**0.58**
Instructional level				
Elementary	2.38	2.28	1.62	0.64
Secondary	2.38	2.63	1.53	0.98
Enrollment size				
Less than 300	4.54	4.56	2.93	1.37
300 to 999	2.32	2.24	1.58	0.69
1,000 or more	3.56	3.62	2.26	0.97
Locale				
City	3.64	3.48	2.60	1.05
Urban fringe	3.00	2.97	1.77	0.82
Town	4.36	4.33	3.20	1.19
Rural	3.98	3.82	2.72	1.46
Percent minority enrollment in school				
Less than 6 percent	3.44	3.29	2.68	0.80
6 to 20 percent	3.49	3.70	2.21	1.26
21 to 49 percent	3.47	3.39	2.49	1.19
50 percent or more	4.05	3.85	2.22	0.84
Percent of students in school eligible for free or reduced-price school lunch				
Less than 11 percent	4.31	4.60	2.89	1.36
11 to 30 percent	3.29	3.32	2.52	0.87
31 to 49 percent	3.69	3.97	3.13	1.44
50 to 70 percent	4.40	4.04	2.63	1.56
71 percent or more	5.09	4.82	2.42	1.19

NOTE: Teachers who reported that computers were not available to them in the classroom were excluded from the analyses presented in this table.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Table A-3.5a.—Standard errors of the percent of public school teachers having e-mail available to them at school, by school characteristics: 1999

School characteristics	E-mail available at school	
	Yes	No
All public school teachers	**1.47**	**1.47**
Locale		
City	2.68	2.68
Urban fringe	2.58	2.58
Town	3.21	3.21
Rural	2.74	2.74
Percent minority enrollment in school		
Less than 6 percent	2.58	2.58
6 to 20 percent	2.77	2.77
21 to 49 percent	2.77	2.77
50 percent or more	3.16	3.16
Percent of students in school eligible for free or reduced-price school lunch		
Less than 11 percent	3.28	3.28
11 to 30 percent	2.47	2.47
31 to 49 percent	2.98	2.98
50 to 70 percent	3.96	3.96
71 percent or more	4.02	4.02

NOTE: Teachers who reported that computers were not available to them anywhere in the school were excluded from the analyses presented in this table.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Table A-3.6a.—Standard errors of the percent of public school teachers having computers and the Internet available to them at home, and the percent of teachers having a school network that they can access from home, by school characteristics: 1999

School characteristics	Computer available at home		Internet available at home		School network accessible from home	
	Yes	No	Yes	No	Yes	No
All public school teachers	**1.01**	**1.01**	**1.30**	**1.30**	**1.21**	**1.21**
Enrollment size						
Less than 300	3.53	3.53	3.67	3.67	2.96	2.96
300 to 999	1.28	1.28	1.67	1.67	1.59	1.59
1,000 or more	1.68	1.68	2.42	2.42	2.20	2.20
Locale						
City	2.03	2.03	2.49	2.49	2.07	2.07
Urban fringe	1.45	1.45	2.06	2.06	2.13	2.13
Town	2.48	2.48	3.40	3.40	3.35	3.35
Rural	2.53	2.53	2.89	2.89	2.24	2.44
Percent of students in school eligible for free or reduced-price school lunch						
Less than 11 percent	2.52	2.52	3.29	3.29	3.65	3.65
11 to 30 percent	1.62	1.62	2.20	2.20	2.14	2.14
31 to 49 percent	2.12	2.12	3.24	3.24	2.63	2.63
50 to 70 percent	2.83	2.83	3.55	3.55	3.04	3.04
71 percent or more	3.02	3.02	3.24	3.24	2.90	2.90

NOTE: Teachers who reported that computers were not available to them anywhere in the school were excluded from the “School network accessible from home” analyses presented in this table.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Table A-3.7a.—Standard errors of the percent of public school teachers reporting that more than 50 percent of their students have computers at home, by school characteristics: 1999

School characteristics	Percent of teachers reporting >50% of students have computers at home
All public school teachers	**1.54**
Enrollment size	
Less than 300	3.99
300 to 999	1.98
1,000 or more	2.98
Locale	
City	2.71
Urban fringe	2.56
Town	3.70
Rural	3.24
Percent minority enrollment in school	
Less than 6 percent	2.76
6 to 20 percent	3.24
21 to 49 percent	2.93
50 percent or more	1.95
Percent of students in school eligible for free or reduced-price school lunch	
Less than 11 percent	3.80
11 to 30 percent	2.51
31 to 49 percent	3.20
50 to 70 percent	3.15
71 percent or more	0.83

SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Table A-3.8a.—Standard errors of the percent of public school teachers by number of computers available in classroom who report assignment of various activities to a small, moderate, or large extent, or not at all: 1999

Activities	Number of computers available in the classroom		
	One	2-5	More than 5
All public school teachers	**1.47**	**1.45**	**0.81**
Solve problems/analyze data			
Not at all	2.30	2.25	3.45
Small extent	1.93	1.95	4.05
Moderate extent	1.71	1.99	3.82
Large extent	0.98	1.31	3.43
Word processing/spreadsheets			
Not at all	2.34	2.10	2.87
Small extent	1.67	1.91	3.51
Moderate extent	1.86	1.93	3.60
Large extent	1.57	1.85	4.05
Drills/practice			
Not at all	2.18	2.23	3.23
Small extent	1.81	1.88	3.43
Moderate extent	1.56	1.95	3.75
Large extent	0.98	1.76	4.06

NOTE: Teachers who reported that computers were not available them in the classroom were excluded from the analyses presented in this table.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Table A-3.9.—Standard errors for the figures and for data not shown in tables in chapter 3: FRSS 1999; NAEP 1990, 1994, 1998; CPS 1994, 1997, 1998

Item	Estimate	Standard error
Figure 3.1: Percent of public school 4th-, 8th-, and 12th-grade students who had school administrators reporting varying numbers of computers at the school: 1990 and 1998		
4th-grade: 1990: 76 or more computers	1	0.54
4th-grade: 1990: 51 to 75 computers	3	1.13
4th-grade: 1990: 26 to 50 computers	28	3.05
4th-grade: 1990: 1 to 25 computers	60	3.28
4th-grade: 1990: none available	7	1.79
4th-grade: 1998: 76 or more computers	33	2.99
4th-grade: 1998: 51 to 75 computers	20	1.89
4th-grade: 1998: 26 to 50 computers	31	2.74
4th-grade: 1998: 1 to 25 computers	16	2.44
4th-grade: 1998: none available	0	0.00
8th-grade: 1990: 76 or more computers	8	3.55
8th-grade: 1990: 51 to 75 computers	13	2.97
8th-grade: 1990: 26 to 50 computers	36	4.11
8th-grade: 1990: 1 to 25 computers	40	3.75
8th-grade: 1990: none available	3	1.33
8th-grade: 1998: 76 or more computers	51	3.49
8th-grade: 1998: 51 to 75 computers	20	2.77
8th-grade: 1998: 26 to 50 computers	22	2.73
8th-grade: 1998: 1 to 25 computers	7	1.51
8th-grade: 1998: none available	0	0.00
12th-grade: 1990: 76 or more computers	42	4.27
12th-grade: 1990: 51 to 75 computers	21	3.87
12th-grade: 1990: 26 to 50 computers	27	4.01
12th-grade: 1990: 1 to 25 computers	11	2.15
12th-grade: 1990: none available	0	0.35
12th-grade: 1998: 76 or more computers	73	2.49
12th-grade: 1998: 51 to 75 computers	13	2.30
12th-grade: 1998: 26 to 50 computers	11	1.74
12th-grade: 1998: 1 to 25 computers	3	1.03
12th-grade: 1998: none available	0	0.00
Figure 3.2: Percent of public school 4th-, 8th-, and 12th-grade students who had school administrators reporting computer labs at school, computers in the classroom, or computers available to bring to class: 1998		
Computer labs at school: 4th-grade	78	2.35
Computer labs at school: 8th-grade	90	1.60
Computer labs at school: 12th-grade	94	1.58
Always have computers in the classroom: 4th-grade	83	2.10
Always have computers in the classroom: 8th-grade	46	3.40
Always have computers in the classroom: 12th-grade	27	2.90
Computers available to bring to class: 4th-grade	39	3.52
Computers available to bring to class: 8th-grade	42	2.48
Computers available to bring to class: 12th-grade	40	3.57
Figure 3.3: Percent of public school 4th- and 8th- grade students having teachers reporting computers available in their classes or labs as their best computer availability: 1998		
1998: available in class: 4th-grade	72	2.22
1998: available in class: 8th-grade	49	2.60
1998: available in lab: 4th-grade	23	2.06
1998: available in lab: 8th-grade	42	2.39
Figure 3.5: Ratio of students per instructional computer and students per instructional computer with Internet access, by school characteristics: 1999		
Ratio of students per instructional computers:		
All public schools	6	102.6
Enrollment size: less than 300	4	191.2

Table A-3.9.—Standard errors for the figures and for data not shown in tables in chapter 3: FRSS 1999; NAEP 1990, 1994, 1998; CPS 1994, 1997, 1998—Continued

Item	Estimate	Standard error
Enrollment size: 300 to 999	6	128.0
Enrollment size: 1,000 or more	6	282.9
Locale: city	6	235.2
Locale: urban fringe	6	193.7
Locale: town	6	224.3
Locale: rural	4	182.4
Percent minority enrollment in school: less than 6 percent	5	154.5
Percent minority enrollment in school: 6 to 20 percent	5	221.4
Percent minority enrollment in school: 21 to 49 percent	6	213.2
Percent minority enrollment in school: 50 percent or more	6	273.8
Percent of students in school eligible for free or reduced-price lunch: less than 11 percent	5	206.7
Percent of students in school eligible for free or reduced-price lunch: 11 to 30 percent	5	213.1
Percent of students in school eligible for free or reduced-price lunch: 31 to 49 percent	6	272.8
Percent of students in school eligible for free or reduced-price lunch: 50 to 70 percent	6	312.8
Percent of students in school eligible for free or reduced-price lunch: 71 percent or more	6	328.3
Ratio of students per instructional computers with Internet access:		
All public schools	9	287.2
Enrollment size: less than 300	6	411.7
Enrollment size: 300 to 999	9	404.5
Enrollment size: 1,000 or more	10	550.5
Locale: city	11	756.8
Locale: urban fringe	9	412.7
Locale: town	8	583.1
Locale: rural	7	434.8
Percent minority enrollment in school: less than 6 percent	7	320.8
Percent minority enrollment in school: 6 to 20 percent	8	462.4
Percent minority enrollment in school: 21 to 49 percent	9	724.2
Percent minority enrollment in school: 50 percent or more	13	1084.3
Percent of students in school eligible for free or reduced-price lunch: less than 11 percent	7	478.0
Percent of students in school eligible for free or reduced-price lunch: 11 to 30 percent	8	458.3
Percent of students in school eligible for free or reduced-price lunch: 31 to 49 percent	9	392.4
Percent of students in school eligible for free or reduced-price lunch: 50 to 70 percent	10	803.9
Percent of students in school eligible for free or reduced-price lunch: 71 percent or more	16	2046.3
Figure 3.7: Percent of elementary and secondary teachers and adults in other occupations who report having computers at home: 1994, 1997, and 1998		
1994: teachers	54	1.43
1994: adults in other occupations	28	0.17
1997: teachers	66	1.38
1997: adults in other occupations	40	0.18
1998: teachers	74	1.25
1998: adults in other occupations	46	0.19
Figure 3.8: Percent of public school teachers having varying numbers of computers connected to the Internet when there are computers in the classroom: 1999		
Computers connected to the Internet: none	37	1.82
Computers connected to the Internet: one	46	1.76
Computers connected to the Internet: 2-5	13	1.23
Computers connected to the Internet: more than 5	4	0.54
Figure 3.9: Percent of public school teachers who report using computers or the Internet a little or a lot for various activities, by number of classroom computers: 1999		
Create instructional materials: one: a little	38	2.03
Create instructional materials: one: a lot	41	2.08
Create instructional materials: one: to any extent	79	1.78
Create instructional materials: 2-5: a little	41	2.13
Create instructional materials: 2-5: a lot	45	2.29
Create instructional materials: 2-5: to any extent	86	1.6

Table A-3.9.—Standard errors for the figures and for data not shown in tables in chapter 3: FRSS 1999; NAEP 1990, 1994, 1998; CPS 1994, 1997, 1998—Continued

Item	Estimate	Standard error
Create instructional materials: more than 5: a little	36	4.00
Create instructional materials: more than 5: a lot	52	4.26
Create instructional materials: more than 5: to any extent	88	2.72
Gather information for lesson plans: one: a little	46	2.22
Gather information for lesson plans: one: a lot	13	1.33
Gather information for lesson plans: one: to any extent	59	2.29
Gather information for lesson plans: 2-5: a little	48	2.14
Gather information for lesson plans: 2-5: a lot	17	1.55
Gather information for lesson plans: 2-5: to any extent	65	2.06
Gather information for lesson plans: more than 5: a little	41	4.27
Gather information for lesson plans: more than 5: a lot	28	3.86
Gather information for lesson plans: more than 5: to any extent	69	4.26
Administrative record keeping: one: a little	17	1.57
Administrative record keeping: one: a lot	37	2.12
Administrative record keeping: one: to any extent	54	2.32
Administrative record keeping: 2-5: a little	17	1.76
Administrative record keeping: 2-5: a lot	36	2.29
Administrative record keeping: 2-5: to any extent	53	2.34
Administrative record keeping: more than 5: a little	16	3.23
Administrative record keeping: more than 5: a lot	47	4.28
Administrative record keeping: more than 5: to any extent	63	4.26
Access research and best practice examples: one: a little	31	2.08
Access research and best practice examples: one: a lot	7	1.04
Access research and best practice examples: one: to any extent	38	2.23
Access research and best practice examples: 2-5: a little	30	2.03
Access research and best practice examples: 2-5: a lot	9	1.17
Access research and best practice examples: 2-5: to any extent	39	2.17
Access research and best practice examples: more than 5: a little	45	4.27
Access research and best practice examples: more than 5: a lot	10	2.35
Access research and best practice examples: more than 5: to any extent	55	4.35
Multimedia presentations: one: a little	27	1.85
Multimedia presentations: one: a lot	6	0.97
Multimedia presentations: one: to any extent	33	2.03
Multimedia presentations: 2-5: a little	34	2.02
Multimedia presentations: 2-5: a lot	8	1.24
Multimedia presentations: 2-5: to any extent	43	2.23
Multimedia presentations: more than 5: a little	36	4.04
Multimedia presentations: more than 5: a lot	21	3.57
Multimedia presentations: more than 5: to any extent	57	4.21
Access model lesson plans: one: a little	27	2.02
Access model lesson plans: one: a lot	6	0.95
Access model lesson plans: one: to any extent	33	2.15
Access model lesson plans: 2-5: a little	30	2.03
Access model lesson plans: 2-5: a lot	8	1.15
Access model lesson plans: 2-5: to any extent	38	2.15
Access model lesson plans: more than 5: a little	39	4.29
Access model lesson plans: more than 5: a lot	8	2.17
Access model lesson plans: more than 5: to any extent	48	4.33

Table A-3.9.—Standard errors for the figures and for data not shown in tables in chapter 3: FRSS 1999; NAEP 1990, 1994, 1998; CPS 1994, 1997, 1998—Continued

Item	Estimate	Standard error
Chapter 3, section on teachers' reports of computer availability to students		
Percent of 4th grade public school students who have teachers reporting computers are not available as their best computer availability	5	1.01
Percent of 4th grade public school students who have teachers reporting computers are available in lab or library but difficult to access as their best computer availability	12	1.71
Percent of 4th grade public school students who have teachers reporting computers are readily available in lab or library as their best computer availability	14	1.61
Percent of 4th grade public school students who have teachers reporting one computer in class as their best computer availability	30	2.26
Percent of 4th grade public school students who have teachers reporting several computers in class as their best computer availability	39	2.61
Percent of 8th grade public school students who have teachers reporting computers are not available as their best computer availability	11	1.76
Percent of 8th grade public school students who have teachers reporting computers are available in lab or library but difficult to access as their best computer availability	31	2.68
Percent of 8th grade public school students who have teachers reporting computers are readily available in lab or library as their best computer availability	22	2.20
Percent of 8th grade public school students who have teachers reporting one computer in class as their best computer availability	20	2.13
Percent of 8th grade public school students who have teachers reporting several computers in class as their best computer availability	15	1.58
Chapter 3, section on teachers' computer availability at home		
Percent of teachers in 1998 who had one computer at home	71	1.50
Percent of teachers in 1998 who had two computers at home	20	1.33
Percent of teachers in 1998 who had three or more computers at home	9	0.93
Percent of adults in other occupations in 1998 who had one computer at home	75	0.24
Percent of adults in other occupations in 1998 who had two computers at home	18	0.21
Percent of adults in other occupations in 1998 who had three or more computers at home	7	0.14
Percent of teachers in 1998 who had computers that were three years old or newer	71	2.48
Percent of adults in other occupations in 1998 who had computers that were three years old or newer	75	0.38
Chapter 3, section on students' computer availability at home		
Percent of students in 1994 who had at least one computer at home	36	0.34
Percent of students in 1998 who had at least one computer at home	56	0.36
Chapter 3, section on computer availability in the school		
Percent of public school teachers in 1999 who had computers available somewhere in their schools	99	0.19

SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999; National Assessment of Educational Progress (NAEP), 1990, 1994, and 1998 Reading Assessments, 1990 Math Assessments; U.S. Census Bureau, Current Population Survey, November 1994, October 1997, December 1998.

Table A-4.1a.—Standard errors of the percent of public school teachers reporting using e-mail at school to a large extent when available, by school characteristics: 1999

School characteristics	E-mail used
All public school teachers	**1.64**
Locale	
City	3.08
Urban fringe	2.91
Town	3.93
Rural	3.42
Percent minority enrollment in school	
Less than 6 percent	3.06
6 to 20 percent	3.58
21 to 49 percent	3.11
50 percent or more	3.32
Percent of students in school eligible for free or reduced-price school lunch	
Less than 11 percent	4.08
11 to 30 percent	3.17
31 to 49 percent	3.56
50 to 70 percent	3.91
71 percent or more	4.04

NOTE: Teachers who reported that e-mail was not available to them anywhere in the school were excluded from the analyses presented in this table.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Table A-4.2a.—Standard errors of the percent of public school teachers reporting student use of the Internet in the classroom, computer labs, media centers, or libraries to any extent during class time, by school characteristics: 1999

School characteristics	Internet used
All public school teachers	**1.44**
Locale	
City	2.85
Urban fringe	2.37
Town	3.28
Rural	3.25
Percent minority enrollment in school	
Less than 6 percent	2.63
6 to 20 percent	2.84
21 to 49 percent	2.97
50 percent or more	3.03
Percent of students in school eligible for free or reduced-price school lunch	
Less than 11 percent	3.57
11 to 30 percent	2.76
31 to 49 percent	2.88
50 to 70 percent	3.66
71 percent or more	3.60

NOTE: Teachers who reported that the Internet was not available to them anywhere in the school were excluded from the analyses presented in this table.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Table A-4.3.—Standard errors for the figures and for data not shown in tables in chapter 4: FRSS 1999; NAEP 1992, 1994, 1996, and 1998; CPS 1997 and 1998

Item	Estimate	Standard error
Figure 4.1: Percent of elementary and secondary teachers reporting use of the Internet at work: 1997 and 1998		
Elementary teachers: 1997	23	1.68
Elementary teachers: 1998	33	1.79
Secondary teachers: 1997	28	2.24
Secondary teachers: 1998	43	2.38
Figure 4.2: Percent of public school teachers reporting use of computers, the Internet, and e-mail at school to any extent when available: 1999		
Computers: to any extent	99	0.23
Internet: to any extent	96	0.59
E-mail: to any extent	77	1.41
Figure 4.3: Percent of public school teachers reporting frequency of use of various technologies to a small, moderate, or large extent: 1999		
Computers in classroom: small extent	25	1.28
Computers in classroom: moderate extent	34	1.41
Computers in classroom: large extent	39	1.50
Computers in classroom: to any extent	98	0.46
Computers elsewhere in school: small extent	37	1.32
Computers elsewhere in school: moderate extent	31	1.30
Computers elsewhere in school: large extent	18	1.03
Computers elsewhere in school: to any extent	85	0.99
Internet in classroom: small extent	37	1.74
Internet in classroom: moderate extent	30	1.63
Internet in classroom: large extent	20	1.43
Internet in classroom: to any extent	88	1.17
Internet elsewhere in school: small extent	41	1.39
Internet elsewhere in school: moderate extent	20	1.12
Internet elsewhere in school: large extent	10	0.83
Internet elsewhere in school: to any extent	70	1.42
E-mail in school: small extent	25	1.40
E-mail in school: moderate extent	18	1.20
E-mail in school: large extent	34	1.64
E-mail in school: to any extent	77	1.41
Figure 4.4: Percent of public school teachers reporting use of computers or the Internet in the classroom to a large extent, by numbers of computers and computers with Internet connections in the classroom: 1999		
Number of computers available in classroom: one	28	1.94
Number of computers available in classroom: 2-5	43	2.15
Number of computers available in classroom: more than 5	62	4.21
Number of computers with Internet connections available in classroom: one	18	1.57
Number of computers with Internet connections available in classroom: 2-5	22	3.21
Number of computers with Internet connections available in classroom: more than 5	45	7.07
Figure 4.5: Percent of public school teachers reporting use of computers or the Internet elsewhere in the school to a large extent, by numbers of computers and computers with Internet connections in the classroom: 1999		
Number of computers available in classroom for instruction: none	10	1.28
Number of computers available in classroom for instruction: one	20	1.83
Number of computers available in classroom for instruction: 2-5	23	2.29
Number of computers available in classroom for instruction: more than 5	23	4.08
Number of computers with Internet connections available in classroom: none	7	1.02
Number of computers with Internet connections available in classroom: one	12	1.37
Number of computers with Internet connections available in classroom: 2-5	12	2.89
Number of computers with Internet connections available in classroom: more than 5	24	5.91

Table A-4.3.—Standard errors for the figures and for data not shown in tables in chapter 4: FRSS 1999; NAEP 1992, 1994, 1996, and 1998; CPS 1997 and 1998—Continued

Item	Estimate	Standard error
Figure 4.6: Percent of public school teachers reporting use of computers, e-mail, and the Internet at school to a large extent, by years of teaching experience: 1999		
Computers at school: 3 or fewer years	48	3.72
Computers at school: 4 to 9 years	45	2.91
Computers at school: 10 to 19 years	41	2.72
Computers at school: 20 or more years	33	2.01
E-mail at school: 3 or fewer years	48	4.55
E-mail at school: 4 to 9 years	35	3.41
E-mail at school: 10 to 19 years	37	2.97
E-mail at school: 20 or more years	26	2.24
Internet at school: 3 or fewer years	28	3.35
Internet at school: 4 to 9 years	21	2.54
Internet at school: 10 to 19 years	17	1.96
Internet at school: 20 or more years	13	1.38
Figure 4.7: Percent of employed adults in the United States reporting use of computers at work, by various occupations: 1997		
Librarians	95	2.51
Editors and reporters	88	3.33
College and university teachers	80	2.25
Real estate/sales occupations	79	2.56
Lawyers and judges	78	2.28
Secondary teachers	69	2.31
Elementary teachers	67	1.86
Physicians	62	3.17
Clergy	62	4.48
All other occupations	48	0.25
Teachers' aides	40	3.25
Figure 4.8: Percent of public school teachers reporting student use of various technologies in schools and classrooms: 1999		
Computer in a computer lab or library/media center: rarely	13	0.92
Computer in a computer lab or library/media center: sometimes	37	1.28
Computer in a computer lab or library/media center: often	28	1.27
Computer in a computer lab or library/media center: to any extent	78	1.16
Computers in the classroom: rarely	14	0.93
Computers in the classroom: sometimes	29	1.24
Computers in the classroom: often	26	1.31
Computers in the classroom: to any extent	69	1.31
Internet in a computer lab or library/media center: rarely	20	1.06
Internet in a computer lab or library/media center: sometimes	27	1.18
Internet in a computer lab or library/media center: often	9	0.75
Internet in a computer lab or library/media center: to any extent	55	1.46
Internet in the classroom: rarely	14	0.94
Internet in the classroom: sometimes	14	0.99
Internet in the classroom: often	6	0.59
Internet in the classroom: to any extent	34	1.47
Distance learning via the Internet: rarely	10	0.77
Distance learning via the Internet: sometimes	5	0.55
Distance learning via the Internet: often	1	0.28
Distance learning via the Internet: to any extent	16	0.97
Distance learning via other modes of interactive media: rarely	10	0.80
Distance learning via other modes of interactive media: sometimes	5	0.54
Distance learning via other modes of interactive media: often	1	0.33
Distance learning via other modes of interactive media: to any extent	16	0.98

Table A-4.3.—Standard errors for the figures and for data not shown in tables in chapter 4: FRSS 1999; NAEP 1992, 1994, 1996, and 1998; CPS 1997 and 1998—Continued

Item	Estimate	Standard error
Figure 4.9: Percent of public school teachers reporting student use of computers or the Internet in the classroom often, by number of computers and number of computers with Internet connections in the classroom: 1999		
Number of computers available in classroom: one	13	1.53
Number of computers available in classroom: 2-5	41	2.31
Number of computers available in classroom: more than 5	61	4.40
Number of computers with Internet connections available in classroom: one	6	1.02
Number of computers with Internet connections available in classroom: 2-5	18	2.73
Number of computers with Internet connections available in classroom: more than 5	33	6.66
Figure 4.10: Percent of public school teachers reporting student use of computers or the Internet elsewhere in the school often, by number of computers for instruction and number of computers with Internet connections in the classroom: 1999		
Number of computers available in classroom for instruction: none	17	1.66
Number of computers available in classroom for instruction: one	34	2.18
Number of computers available in classroom for instruction: 2-5	33	2.72
Number of computers available in classroom for instruction: more than 5	34	4.56
Number of computers with Internet connections available in classroom: none	5	0.81
Number of computers with Internet connections available in classroom: one	11	1.28
Number of computers with Internet connections available in classroom: 2-5	12	2.54
Number of computers with Internet connections available in classroom: more than 5	29	6.13
Figure 4.11: Percent of public school teachers reporting student use of computers and the Internet at school to any extent, by instructional level: 1999		
Students' use of computers at school: elementary teachers	92	0.98
Students' use of computers at school: secondary teachers	80	1.54
Students' use of Internet at school: elementary teachers	56	1.96
Students' use of Internet at school: secondary teachers	72	1.72
Figure 4.12: Percent of employed U.S. elementary teachers, secondary teachers, and adults in other occupations reporting use of computers and the Internet at home to any extent when computers are available in the household: 1997 and 1998		
Computer use at home when available: 1997: adults in other occupations	74	0.31
Computer use at home when available: 1997: elementary teachers	83	1.82
Computer use at home when available: 1997: secondary teachers	89	1.94
Internet use at home: 1997: adults in other occupations	37	0.24
Internet use at home: 1997: elementary teachers	35	1.89
Internet use at home: 1997: secondary teachers	44	2.50
Internet use at home: 1998: adults in other occupations	51	0.33
Internet use at home: 1998: elementary teachers	57	2.19
Internet use at home: 1998: secondary teachers	60	2.75
Figure 4.13: Percent of public school teachers reporting use of computers and the Internet at home to a large extent, by years of teaching experience: 1999		
Teacher used computer at home: 3 or fewer years	65	3.98
Teacher used computer at home: 4 to 9 years	57	3.11
Teacher used computer at home: 10 to 19 years	46	2.85
Teacher used computer at home: 20 or more years	39	2.16
Teacher used Internet at home: 3 or fewer years	62	4.79
Teacher used Internet at home: 4 to 9 years	55	3.62
Teacher used Internet at home: 10 to 19 years	35	3.05
Teacher used Internet at home: 20 or more years	36	2.51

Table A-4.3.—Standard errors for the figures and for data not shown in tables in chapter 4: FRSS 1999; NAEP 1992, 1994, 1996, and 1998; CPS 1997 and 1998—Continued

Item	Estimate	Standard error
Figure 4.14: Percent of public school teachers reporting technology use in school to a large extent for instruction and student assignment, by their use of computers and the Internet at home: 1999		
Used computers at home: used computers for instruction	54	1.91
Used computers at home: did not use computers for instruction	43	2.14
Used computers at home: assigned projects requiring students to use computers	52	1.58
Used computers at home: did not assign projects requiring students to use computers	37	3.03
Used Internet at home: used computers for instruction	49	2.15
Used Internet at home: did not use computers for instruction	36	2.45
Used Internet at home: assigned projects requiring students to use computers	46	1.81
Used Internet at home: did not assign projects requiring students to use computers	35	3.57
Figure 4.15: Percent of public school 4th -, 8th -, and 12th- grade students reporting using a computer at home at least once a week, once or twice a month, or never or hardly ever: 1992, 1994, and 1998		
4th-grade: 1992: almost every day	7	0.64
4th-grade: 1992: once or twice a week	17	1.06
4th-grade: 1992: once or twice a month	8	0.57
4th-grade: 1992: never or hardly ever	68	1.33
4th-grade: 1994: almost every day	10	0.83
4th-grade: 1994: once or twice a week	20	1.12
4th-grade: 1994: once or twice a month	10	0.58
4th-grade: 1994: never or hardly ever	60	1.49
4th-grade: 1998: almost every day	9	0.72
4th-grade: 1998: once or twice a week	20	0.83
4th-grade: 1998: once or twice a month	17	0.65
4th-grade: 1998: never or hardly ever	55	1.22
8th-grade: 1992: almost every day	8	0.50
8th-grade: 1992: once or twice a week	13	0.55
8th-grade: 1992: once or twice a month	19	0.61
8th-grade: 1992: never or hardly ever	60	1.07
8th-grade: 1994: almost every day	9	0.52
8th-grade: 1994: once or twice a week	15	0.61
8th-grade: 1994: once or twice a month	22	0.65
8th-grade: 1994: never or hardly ever	53	1.08
8th-grade: 1998: almost every day	14	0.72
8th-grade: 1998: once or twice a week	23	0.73
8th-grade: 1998: once or twice a month	28	0.69
8th-grade: 1998: never or hardly ever	34	0.97
12th-grade: 1992: almost every day	17	0.63
12th-grade: 1992: once or twice a week	12	0.40
12th-grade: 1992: once or twice a month	21	0.60
12th-grade: 1992: never or hardly ever	50	0.79
12th-grade: 1994: almost every day	18	0.62
12th-grade: 1994: once or twice a week	17	0.53
12th-grade: 1994: once or twice a month	25	0.56
12th-grade: 1994: never or hardly ever	40	1.02
12th-grade: 1998: almost every day	21	0.63
12th-grade: 1998: once or twice a week	27	0.64
12th-grade: 1998: once or twice a month	30	0.57
12th-grade: 1998: never or hardly ever	23	0.85
Chapter 4, section on overall technology use		
Percent of public school teachers in 1999 who reported that their students used computers either in the classroom or in computer labs, libraries, and media centers	88	0.81
Percent of public school teachers in 1999 who reported that their students used the Internet in the classroom or somewhere else in the school	61	1.43

Table A-4.3.—Standard errors for the figures and for data not shown in tables in chapter 4: FRSS 1999; NAEP 1992, 1994, 1996, and 1998; CPS 1997 and 1998—Continued

Item	Estimate	Standard error
Chapter 4, section on teacher access to computers and the Internet at home		
Percent of public school teachers in 1999 who used home computers to any extent when available	98	0.38
Percent of public school teachers in 1999 who used home computers to a large extent when available	48	1.43
Percent of public school teachers in 1999 who used the Internet at home to any extent when available	97	0.52
Percent of public school teachers in 1999 who used the Internet at home to a large extent when available	43	1.61
Percent of public school teachers in 1999 who used a school network from home when available	56	2.55

SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999; National Assessment of Educational Progress (NAEP), 1992 and 1996 Math Assessments, 1992, 1994, and 1998 Reading Assessments; U.S. Census Bureau, Current Population Survey (CPS): October 1997, and December 1998.

Table 5.1a.—Standard errors of the percent of public school teachers reporting using computers or the Internet for various activities at school to any extent, by extent to which they felt prepared to use computers and the Internet for instruction: 1999

Teachers' feelings of preparedness	Activities				
	Create instructional materials	Gather information for lesson plans	Access model lesson plans	Access research and best practice examples	Multimedia presentations
All public school teachers	**1.13**	**1.41**	**1.30**	**1.34**	**1.35**
Not at all	3.56	3.06	2.29	2.07	2.27
Somewhat	1.51	1.88	1.77	1.71	1.75
Well/very well	1.76	2.21	2.32	2.38	2.41

Table 5.1a.—Standard errors of the percent of public school teachers reporting using computers or the Internet for various activities at school to any extent, by extent to which they felt prepared to use computers and the Internet for instruction: 1999—Continued

Teachers' feelings of preparedness	Activities				
	Administrative record keeping	Communicate with colleagues	Communicate with parents	Communicate with students	Post homework/ assignments
All public school teachers	**1.48**	**1.70**	**1.35**	**0.84**	**0.99**
Not at all	3.29	3.60	2.05	1.37	2.09
Somewhat	1.89	2.06	1.69	1.13	1.38
Well/very well	2.39	2.58	2.27	1.66	1.81

NOTE: Teachers who reported that computers were not available to them anywhere in the school were excluded from the analyses presented in this table.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Table A-5.2a.—Standard errors of the percent of public school teachers reporting assigning students various activities to any extent that use computers or the Internet, by extent to which they felt prepared to use computers and the Internet for instruction: 1999

Teachers' feelings of preparedness	Activities			
	Practice drills	Solve problems/ analyze data	Word processing/ spreadsheets	Graphical presentations
All public school teachers	**1.40**	**1.41**	**1.40**	**1.48**
Not at all	3.41	2.69	3.41	2.91
Somewhat	1.84	2.02	1.90	1.91
Well/very well	2.44	2.25	1.87	2.33

Table A-5.2a.—Standard errors of the percent of public school teachers reporting assigning students various activities to any extent that use computers or the Internet, by extent to which they felt prepared to use computers and the Internet for instruction: 1999—Continued

Teachers' feelings of preparedness	Activities			
	Demonstrations /simulations	Multimedia projects	CD-ROM research	Internet research
All public school teachers	**1.47**	**1.51**	**1.51**	**1.51**
Not at all	2.66	3.22	2.93	3.14
Somewhat	1.86	1.92	1.95	1.93
Well/very well	2.35	2.32	2.37	2.38

NOTE: Teachers who reported that computers were not available to them anywhere in the school were excluded from the analyses presented in this table.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Table A-5.3a.—Standard errors of the percent of public school teachers reporting participation in available training programs, by years of teaching experience: 1999

Training programs	Years of teaching experience			
	3 or fewer	4-9	10-19	20 or more
Computer use/basic computer training	3.73	2.50	1.79	1.24
Software applications	3.97	2.64	2.03	1.65
Use of the Internet	3.84	2.79	2.44	1.85
Use of other advanced telecommunications (e.g., interactive audio, video, closed-circuit TV)	5.37	4.77	3.88	3.32
Integration of technology into the curriculum/ classroom instruction	4.16	3.14	2.58	2.28
Follow-up and/or advanced training	4.51	3.91	3.54	2.80

NOTE: Teachers reporting not having the above listed training programs available were excluded from the analyses presented in this table.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Table A-5.4a.—Standard errors of the percent of public school teachers reporting feeling prepared to various extents to use computers and the Internet for instruction, by hours spent in professional development: 1999

Hours of professional development	Teachers' feelings of preparedness		
	Not at all	Somewhat	Well/very well
All public school teachers	**0.89**	**1.29**	**1.31**
0 hours	3.83	4.04	3.28
1-8 hours	1.44	1.87	1.73
9-32 hours	0.91	2.21	2.18
More than 32 hours	0.88	3.45	3.50

SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Table A-5.5.—Standard errors for the figures and for data not shown in tables in chapter 5: FRSS 1999

Item	Estimate	Standard error
Figure 5.1: Percent of public school teachers who reporting feeling not at all, somewhat, or well/very well prepared to use computers and the Internet for classroom instruction, by years of teaching experience: 1999		
3 or fewer years: not at all prepared	10	2.08
3 or fewer years: somewhat prepared	45	3.56
3 or fewer years: well/very well prepared	45	3.80
4 to 9 years: not at all prepared	10	1.71
4 to 9 years: somewhat prepared	49	2.87
4 to 9 years: well/very well prepared	41	2.89
10 to 19 years: not at all prepared	14	1.82
10 to 19 years: somewhat prepared	55	2.65
10 to 19 years: well/very well prepared	31	2.51
20 or more years: not at all prepared	16	1.45
20 or more years: somewhat prepared	57	2.05
20 or more years: well/very well prepared	27	1.86
Figure 5.2: Percent of public school teachers reporting feeling prepared to use computers and the Internet to a small, moderate, or large extent, by various sources of training: 1999		
Independent learning: small extent	23	1.08
Independent learning: moderate extent	31	1.26
Independent learning: large extent	39	1.29
Independent learning: any extent	93	0.71
Professional development activities: small extent	36	1.27
Professional development activities: moderate extent	34	1.24
Professional development activities: large extent	18	1.09
Professional development activities: any extent	88	0.86
Colleagues: small extent	36	1.30
Colleagues: moderate extent	35	1.24
Colleagues: large extent	16	0.99
Colleagues: any extent	87	0.98
Students: small extent	36	1.27
Students: moderate extent	14	0.90
Students: large extent	4	0.47
Students: any extent	54	1.40
College/graduate work: small extent	26	1.21
College/graduate work: moderate extent	15	0.96
College/graduate work: large extent	10	0.79
College/graduate work: any extent	51	1.32
Figure 5.3: Percent of public school teachers reporting whether college/graduate work prepared them not at all or to any extent to use computers and the Internet, by years of teaching experience: 1999		
3 or fewer years: not at all	16	2.50
3 or fewer years: to any extent	84	2.50
4 to 9 years: not at all	24	2.34
4 to 9 years: to any extent	76	2.34
10 to 19 years: not at all	56	2.53
10 to 19 years: to any extent	44	2.53
20 or more years: not at all	69	1.94
20 or more years: to any extent	31	1.94
Figure 5.4: Percent of public school teachers reporting the availability of professional development training activities for various uses and applications of technology: 1999		
Use of computers/basic computer training	96	0.50
Software application	88	0.87
Use of the Internet	87	0.91
Integration of technology into the curriculum/classroom instruction	79	1.13

Table A-5.5.—Standard errors for the figures and for data not shown in tables in chapter 5: FRSS 1999—Continued

Item	Estimate	Standard error
Follow-up and/or advanced training	67	1.36
Use of other advanced telecommunications	54	1.48
Figure 5.5: Percent of public school teachers reporting the availability of training in the use of the Internet, by percent minority enrollment in school and percent of students in school eligible for free or reduced-price school lunch: 1999		
Percent minority enrollment in school: less than 6 percent	87	1.71
Percent minority enrollment in school: 6 to 20 percent	91	1.67
Percent minority enrollment in school: 21 to 49 percent	90	1.61
Percent minority enrollment in school: 50 percent or more	81	2.25
Percent of students in school eligible for free or reduced-price lunch: less than 11 percent	94	1.65
Percent of students in school eligible for free or reduced-price lunch: 11 to 30 percent	90	1.53
Percent of students in school eligible for free or reduced-price lunch: 31 to 49 percent	91	1.68
Percent of students in school eligible for free or reduced-price lunch: 50 to 70 percent	80	2.82
Percent of students in school eligible for free or reduced-price lunch: 71 percent or more	79	3.09
Figure 5.6: Percent of public school teachers reporting participating in various types of training, when available: 1999		
Use of computers/basic computer training	83	1.02
Software applications	81	1.16
Use of the Internet	75	1.25
Integration of technology into the curriculum/classroom instruction	74	1.39
Follow-up and/or advanced training	55	1.79
Use of other advanced telecommunications	53	2.04
Figure 5.7: Percent of public school teachers reporting number of hours spent in professional development activities in the use of computers or the Internet during the last 3 years: 1999		
0 hours	10	0.78
1-8 hours	43	1.28
9-32 hours	34	1.24
More than 32 hours	12	0.86
Figure 5.8: Percent of public school teachers reporting the availability of certain incentives from the school district for participation in professional development: 1999		
Course credit towards certification is offered	56	1.68
Additional resources for you or your classroom	46	1.56
Expenses are paid	40	1.50
School provides release time	39	1.52
Stipends are provided	32	1.59
Connection to the Internet from home through your school's network	22	1.34
Figure 5.9: Percent of public school teachers reporting availability of certain incentives from the school district for participation in professional development, by school enrollment: 1999		
Less than 300: release time	53	3.94
Less than 300: expenses paid	53	4.12
Less than 300: connection to the Internet from home	13	3.09
300-999: release time	37	1.87
300-999: expenses paid	40	1.88
300-999: connection to the Internet from home	22	1.74
1000 or more: release time	37	3.32
1000 or more: expenses paid	36	3.07
1000 or more: connection to the Internet from home	24	2.61

Table A-5.5.—Standard errors for the figures and for data not shown in tables in chapter 5: FRSS 1999—Continued

Item	Estimate	Standard error
Chapter 5, section on teachers' feelings of preparedness		
Percent of public school teachers in 1999 who reported feeling very well prepared to use computers and the Internet for classroom instruction	10	0.79
Percent of public school teachers in 1999 who reported feeling well prepared to use computers and the Internet for classroom instruction	23	1.09
Percent of public school teachers in 1999 who reported feeling somewhat prepared to use computers and the Internet for classroom instruction	53	1.30
Percent of public school teachers in 1999 who reported feeling not at all prepared to use computers and the Internet for classroom instruction	13	0.87

SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Table A-6.1a.—Standard errors of the percent of public school teachers reporting various barriers as great barriers to the use of computers and the Internet for instruction, by school characteristics: 1999

School characteristics	Great barriers		
	Not enough computers	Outdated, incompatible, or unreliable computers	Internet access not easily accessible
All public school teachers	**1.41**	**1.30**	**1.36**
Instructional level			
Elementary	1.90	1.75	1.85
Secondary	1.94	1.82	1.73
Enrollment size			
Less than 300	3.65	3.42	3.70
300 to 999	1.74	1.64	1.73
1,000 or more	3.04	2.72	2.65
Locale			
City	2.73	2.66	2.62
Urban fringe	2.43	2.14	2.21
Town	3.49	2.98	3.44
Rural	2.75	2.63	2.93
Percent minority enrollment in school			
Less than 6 percent	2.51	2.18	2.45
6 to 20 percent	2.77	2.64	2.47
21 to 49 percent	3.10	2.76	2.78
50 percent or more	2.92	2.77	3.04

NOTE: Teachers who reported that computers were not available to them anywhere in the school were excluded from the analyses presented in this table.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Table A-6.2a.—Standard errors of the percent of public school teachers reporting using computers or the Internet for various activities at school to a large extent, by extent to which they perceived various conditions to be barriers to computer and Internet use: 1999

Teachers' reports of barriers	Activities			
	Practice drills	Solve problems/ analyze data	Word processing/ spreadsheets	Internet research
All public school teachers	**0.97**	**0.76**	**1.11**	**0.85**
Not enough computers				
Not at all	2.28	1.89	2.44	1.84
Small barrier	2.15	1.58	2.69	2.11
Moderate barrier	1.78	1.47	2.41	1.96
Great barrier	1.31	1.14	1.52	1.21
Lack of time in schedule				
Not at all	2.47	2.45	2.60	1.82
Small barrier	2.17	1.61	2.51	2.16
Moderate barrier	1.72	0.97	1.96	1.43
Great barrier	1.40	1.24	1.73	1.31

NOTE: Teachers who reported that computers were not available to them anywhere in the school were excluded from the analyses presented in this table.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Table A-6.3.—Standard errors for the figures and for data not shown in tables in chapter 6: FRSS 1999

Item	Estimate	Standard error
Figure 6.1: Percent of public school teachers reporting small, moderate, or great barriers to their use of computers and the Internet for instruction: 1999		
Lack of release time for teachers to learn/practice/plan ways to use computers or the Internet: barrier to any extent	82	1.03
Lack of release time for teachers to learn/practice/plan ways to use computers or the Internet: small barrier	23	1.07
Lack of release time for teachers to learn/practice/plan ways to use computers or the Internet: moderate barrier	23	1.12
Lack of release time for teachers to learn/practice/plan ways to use computers or the Internet: great barrier	37	1.33
Lack of time in schedule for students to use computers in class: barrier to any extent	80	1.08
Lack of time in schedule for students to use computers in class: small barrier	21	1.05
Lack of time in schedule for students to use computers in class: moderate barrier	27	1.21
Lack of time in schedule for students to use computers in class: great barrier	32	1.29
Not enough computers: barrier to any extent	78	1.17
Not enough computers: small barrier	18	0.98
Not enough computers: moderate barrier	21	1.10
Not enough computers: great barrier	38	1.41
Lack of good instructional software: barrier to any extent	71	1.33
Lack of good instructional software: small barrier	29	1.24
Lack of good instructional software: moderate barrier	22	1.05
Lack of good instructional software: great barrier	20	1.12
Lack of support regarding ways to integrate telecommunications into the curriculum: barrier to any extent	68	1.34
Lack of support regarding ways to integrate telecommunications into the curriculum: small barrier	27	1.16
Lack of support regarding ways to integrate telecommunications into the curriculum: moderate barrier	23	1.11
Lack of support regarding ways to integrate telecommunications into the curriculum: great barrier	18	1.04
Inadequate training opportunities: barrier to any extent	67	1.38
Inadequate training opportunities: small barrier	27	1.18
Inadequate training opportunities: moderate barrier	21	1.10
Inadequate training opportunities: great barrier	18	1.03
Outdated, incompatible, or unreliable computers: barrier to any extent	66	1.41
Outdated, incompatible, or unreliable computers: small barrier	20	1.04
Outdated, incompatible, or unreliable computers: moderate barrier	20	1.10
Outdated, incompatible, or unreliable computers: great barrier	25	1.30
Lack of technical support or advice: barrier to any extent	64	1.35
Lack of technical support or advice: small barrier	26	1.14
Lack of technical support or advice: moderate barrier	22	1.07
Lack of technical support or advice: great barrier	16	1.00
Concern about student access to inappropriate materials: barrier to any extent	59	1.39
Concern about student access to inappropriate materials: small barrier	28	1.17
Concern about student access to inappropriate materials: moderate barrier	18	1.02
Concern about student access to inappropriate materials: great barrier	13	0.89
Internet access is not easily accessible: barrier to any extent	58	1.50
Internet access is not easily accessible: small barrier	16	0.93
Internet access is not easily accessible: moderate barrier	16	0.99
Internet access is not easily accessible: great barrier	27	1.36
Lack of administrative support: barrier to any extent	43	1.46
Lack of administrative support: small barrier	20	1.07
Lack of administrative support: moderate barrier	14	0.92
Lack of administrative support: great barrier	9	0.79
Figure 6.2: Percent of public school teachers reporting lack of release time to learn, practice, or plan ways to use technology as a small, moderate, or great barrier to the use of computers and the Internet for instruction, by years of teaching experience: 1999		
3 or fewer years: small barrier	28	3.09
3 or fewer years: moderate barrier	22	2.77

Table A-6.3.—Standard errors for the figures and for data not shown in tables in chapter 6: FRSS 1999—Continued

Item	Estimate	Standard error
3 or fewer years: great barrier	25	3.22
4 to 9 years: small barrier	26	2.47
4 to 9 years: moderate barrier	21	2.28
4 to 9 years: great barrier	34	2.80
10-19 years: small barrier	22	2.12
10-19 years: moderate barrier	22	2.07
10-19 years: great barrier	41	2.54
20 or more years: small barrier	21	1.73
20 or more years: moderate barrier	25	1.92
20 or more years: great barrier	39	2.04
Figure 6.3: Percent of public school teachers reporting lack of support regarding ways to integrate technology into the curriculum as a small, moderate, or great barrier to the use of computers and the Internet for instruction, by percent minority enrollment in school: 1999		
Small barrier: Less than 6 percent	26	2.20
Small barrier: 6 to 20 percent	29	2.48
Small barrier: 21 to 49 percent	27	2.35
Small barrier: 50 percent or more	26	2.27
Moderate barrier: Less than 6 percent	24	2.11
Moderate barrier: 6 to 20 percent	24	2.34
Moderate barrier: 21 to 49 percent	24	2.07
Moderate barrier: 50 percent or more	21	2.40
Great barrier: Less than 6 percent	19	1.92
Great barrier: 6 to 20 percent	15	2.22
Great barrier: 21 to 49 percent	13	1.70
Great barrier: 50 percent or more	24	2.40
Figure 6.4: Percent of public school teachers reporting lack of institutional and technical support as small, moderate, or great barriers to the use of computers and the Internet for instruction, by availability of a technology coordinator: 1999		
Lack of administrative support: technology coordinator available: barrier to any extent	41	1.54
Lack of administrative support: technology coordinator available: small barrier	20	1.11
Lack of administrative support: technology coordinator available: moderate barrier	13	0.98
Lack of administrative support: technology coordinator available: great barrier	8	0.79
Lack of administrative support: no technology coordinator available: barrier to any extent	55	3.70
Lack of administrative support: no technology coordinator available: small barrier	22	3.04
Lack of administrative support: no technology coordinator available: moderate barrier	16	2.61
Lack of administrative support: no technology coordinator available: great barrier	17	2.74
Lack of support regarding ways to integrate technology into the curriculum: technology coordinator available: barrier to any extent	66	1.46
Lack of support regarding ways to integrate technology into the curriculum: technology coordinator available: small barrier	28	1.24
Lack of support regarding ways to integrate technology into the curriculum: technology coordinator available: moderate barrier	23	1.19
Lack of support regarding ways to integrate technology into the curriculum: technology coordinator available: great barrier	15	1.03
Lack of support regarding ways to integrate technology into the curriculum: no technology coordinator available: barrier to any extent	79	2.95
Lack of support regarding ways to integrate technology into the curriculum: no technology coordinator available: small barrier	22	3.04
Lack of support regarding ways to integrate technology into the curriculum: no technology coordinator available: moderate barrier	24	2.95
Lack of support regarding ways to integrate technology into the curriculum: no technology coordinator available: great barrier	33	3.36
Lack of technical support or advice: technology coordinator available: barrier to any extent	60	1.47
Lack of technical support or advice: technology coordinator available: small barrier	27	1.24
Lack of technical support or advice: technology coordinator available: moderate barrier	20	1.12
Lack of technical support or advice: technology coordinator available: great barrier	12	0.95
Lack of technical support or advice: no technology coordinator available: barrier to any extent	87	2.58

Table A-6.3.—Standard errors for the figures and for data not shown in tables in chapter 6: FRSS 1999—Continued

Item	Estimate	Standard error
Lack of technical support or advice: no technology coordinator available: small barrier	17	2.71
Lack of technical support or advice: no technology coordinator available: moderate barrier	30	3.23
Lack of technical support or advice: no technology coordinator available: great barrier	39	3.21
Chapter 6, introduction		
Percent of public school teachers in 1999 who reported that they did not use computers or the Internet for instruction	47	1.36
Chapter 6, section on differences in teachers' reports of great barriers in the availability of and access to computers and the Internet		
Percent of elementary public school teachers in 1999 who reported not enough computers was a great barrier	36	1.90
Percent of secondary public school teachers in 1999 who reported not enough computers was a great barrier	43	1.94
Percent of public school teachers in 1999 from schools with less than 300 enrollments who reported not having enough computers was a great barrier	25	3.65
Percent of public school teachers in 1999 from schools with 300 to 999 enrollments who reported not having enough computers was a great barrier	38	1.74
Percent of public school teachers in 1999 from schools with 1000 or more enrollments who reported not having enough computers was a great barrier	46	3.04
Percent of public school teachers in 1999 from city schools who reported not enough computers was a great barrier	43	2.73
Percent of public school teachers in 1999 from rural schools who reported not enough computers was a great barrier	31	2.75
Percent of elementary public school teachers in 1999 who reported outdated, incompatible, or unreliable computers was a great barrier	27	1.75
Percent of secondary public school teachers in 1999 who reported outdated, incompatible, or unreliable computers was a great barrier	21	1.82
Percent of public school teachers in 1999 from schools with less than 6 percent minority enrollments who reported outdated, incompatible, or unreliable computers was a great barrier	22	2.18
Percent of public school teachers in 1999 from schools with more than 50 percent minority enrollments who reported outdated, incompatible, or unreliable computers was a great barrier	32	2.77
Percent of elementary public school teachers in 1999 who reported Internet not easily accessible was a great barrier	28	1.85
Percent of secondary public school teachers in 1999 who reported Internet not easily accessible was a great barrier	23	1.73
Percent of public school teachers in 1999 from schools with less than 6 percent minority enrollments who reported Internet not easily accessible was a great barrier	24	2.45
Percent of public school teachers in 1999 from schools with 6 to 20 percent minority enrollments who reported Internet not easily accessible was a great barrier	20	2.47
Percent of public school teachers in 1999 from schools with more than 50 percent minority enrollments who reported Internet not easily accessible was a great barrier	36	3.04
Chapter 6, section on differences in teachers' reports of lack of time as a great barriers		
Percent of public school teachers in 1999 who reported inadequate training opportunities as a great barrier:		
Instructional level: elementary	18	1.34
Instructional level: secondary	19	1.59
Enrollment size: less than 300	17	3.22
Enrollment size: 300 to 999	17	1.27
Enrollment size: 1,000 or more	20	2.12
Locale: city	19	2.07
Locale: urban fringe	17	1.59
Locale: town	19	2.75
Locale: rural	18	2.24
Percent minority enrollment in school: less than 6 percent	20	1.98

Table A-6.3.—Standard errors for the figures and for data not shown in tables in chapter 6: FRSS 1999—Continued

Item	Estimate	Standard error
Percent minority enrollment in school: 6 to 20 percent	17	2.04
Percent minority enrollment in school: 21 to 49 percent	16	1.85
Percent minority enrollment in school: 50 percent or more	20	2.36
Percent of students in school eligible for free or reduced-price lunch: less than 11 percent	15	2.42
Percent of students in school eligible for free or reduced-price lunch: 11 to 30 percent	19	1.98
Percent of students in school eligible for free or reduced-price lunch: 31 to 49 percent	17	2.10
Percent of students in school eligible for free or reduced-price lunch: 50 to 70 percent	18	2.64
Percent of students in school eligible for free or reduced-price lunch: 71 percent or more	19	2.94
Main teaching assignment: self-contained classroom	19	1.65
Main teaching assignment: math/science	18	2.28
Main teaching assignment: social sciences	19	1.99
Teaching experience: 3 or fewer years	18	2.90
Teaching experience: 4 to 9 years	17	2.18
Teaching experience: 10 to 19 years	18	1.91
Teaching experience: 20 or more years	19	1.59
Percent of elementary public school teachers in 1999 who reported lack of time in students' schedule to use computers and the Internet in class was a great barrier	34	1.74
Percent of secondary public school teachers in 1999 who reported lack of time in students' schedule to use computers and the Internet in class was a great barrier	28	1.70
Chapter 6, section on institutional and technical support for using technology		
Percent of public school teachers in 1999 who had a technology coordinator at school	86	1.00
Percent of public school teachers in 1999 who had a technology coordinator at school, by school and teacher characteristics:		
Instructional level: elementary	86	1.35
Instructional level: secondary	87	1.36
Enrollment size: less than 300	83	3.02
Enrollment size: 300 to 999	86	1.27
Enrollment size: 1,000 or more	88	1.84
Locale: city	86	1.85
Locale: urban fringe	86	1.75
Locale: town	88	2.07
Locale: rural	86	2.20
Percent minority enrollment in school: less than 6 percent	85	2.08
Percent minority enrollment in school: 6 to 20 percent	90	1.57
Percent minority enrollment in school: 21 to 49 percent	86	2.04
Percent minority enrollment in school: 50 percent or more	84	2.13
Percent of students in school eligible for free or reduced-price lunch: less than 11 percent	90	2.14
Percent of students in school eligible for free or reduced-price lunch: 11 to 30 percent	87	1.94
Percent of students in school eligible for free or reduced-price lunch: 31 to 49 percent	88	1.93
Percent of students in school eligible for free or reduced-price lunch: 50 to 70 percent	86	2.31
Percent of students in school eligible for free or reduced-price lunch: 71 percent or more	79	3.20
Main teaching assignment: self-contained classroom	83	1.71
Main teaching assignment: math/science	88	1.81
Main teaching assignment: social sciences	88	1.61
Teaching experience: 3 or fewer years	88	2.41
Teaching experience: 4 to 9 years	86	1.97
Teaching experience: 10 to 19 years	86	1.76
Teaching experience: 20 or more years	87	1.54
Percent of public school teachers in 1999 with 10 to 19 years of teaching experience who reported lack of administrative support was a great barrier	13	1.71
Percent of public school teachers in 1999 with 20 or more years of teaching experience who reported lack of administrative support was a great barrier	7	1.11

SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Appendix B

Survey Methodology and Data Reliability

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Survey Methodology and Data Reliability

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List of Appendix B Tables

Data for this report were drawn primarily from the 1999 "Public School Teachers Use of Computers and the Internet" survey, conducted through the Fast Response Survey System (FRSS) of the National Center for Education Statistics (NCES). Supplemental data presented in this report were taken from the National Assessment of Educational Progress (NAEP) administrations, Current Population Surveys (CPS), and past FRSS surveys on computers and the Internet in public schools. The following sections will describe the data sources and analytical procedures used to calculate the descriptive estimates presented in this report.

The Fast Response Survey System (FRSS)

The Fast Response Survey System (FRSS), conducted through the National Center for Education Statistics (NCES), was established in 1975 to collect and report data on key education issues at the elementary and secondary level quickly and with minimum response burden. The FRSS was designed to meet the data needs of Department of Education analysts, planners, and decision-makers when information could not be collected quickly through traditional NCES surveys. Data collected through FRSS surveys are representative at the national level, drawing from a universe that is appropriate for each study.

In addition to using data collected as part of the 1999 "Public School Teachers Use of Computers and the Internet" survey, this report drew on data published in previous FRSS publications on the technology available in public schools (Bare and Meek, 1998; Carpenter, 1996; Heaviside et al., 1995, 1997). Sampling and data collection procedures, as well as response rates and definitions of analysis variables for each technology survey, are described in detail in those reports.

Sample Selection for the 1999 FRSS Survey

The sample for the FRSS Survey on Public School Teachers' Use of Computers and the Internet consisted of 2,019 full-time teachers in regular public elementary, middle, and high schools in the 50 states and the District of Columbia. To derive the sample of teachers, a sample of 1,000 public schools was first selected from the 1995-96 NCES Common Core of Data (CCD) Public School Universe File. The sampling frame constructed from the 1995-96 CCD file contained 78,697 regular public schools. Special education schools, vocational schools, alternative/other schools, schools in the territories, overseas Department of

Defense schools, schools with a high grade lower than grade 1 or ungraded, and schools that taught only adult education were excluded from the frame. The frame contained 48,714 regular elementary schools, 14,003 regular middle schools, and 15,980 regular high/combined schools. Elementary schools were defined as schools with the lowest grade less than or equal to grade 3 and the highest grade less than or equal to grade 8. Secondary schools were defined as schools with a lowest grade higher than or equal to grade 7 and a highest grade less than or equal to grade 12. Combined schools were defined as having a lowest grade less than or equal to grade 3 and a highest grade greater than or equal to grade 9. Secondary schools and combined schools were combined into one category for sampling. Middle schools were assigned to either the elementary or the secondary/combined stratum depending on their grade span.

The public school sampling frame was stratified by instructional level (elementary and secondary/combined) and school size (less than 300, 300 to 999, and 1,000 or more). Within the primary strata, schools were also sorted by type of locale (central city, urban fringe, town, rural), geographic region, and percent of students in the school eligible for free or reduced-price school lunch to produce additional implicit stratification. A sample of 1,000 schools was then selected from the sorted frame with probabilities proportionate to size, where the measure of size was the square root of the estimated number of full-time-equivalent (FTE) teachers in the school. The sample contained 500 elementary schools and 500 secondary/combined schools. Each sampled school was asked to send a list of their eligible teachers, from which a teacher sampling frame was prepared. The teacher sampling frame was designed to represent regular full-time teachers who taught in any of grades 1 through 12. Only teachers whose primary assignment was bilingual education/English as a second language, special education, and vocational education were excluded. To prepare the teacher lists, schools were asked to start with a list of all the teachers in the school, and then to cross off the following types of teachers: part-time, itinerant, and substitute teachers; teachers' aides; unpaid volunteers; principals (even those who teach); kindergarten or preschool teachers; or anyone on the list who was not a classroom teacher (e.g., librarians, secretaries, or custodians). Next, schools were instructed to cross off the list any teachers whose primary teaching assignment was bilingual education/English as a second language, special education, or vocational education.

Within selected schools, teacher sampling rates were designed to select at least one but no more than four teachers per school, with an average of slightly more than two teachers per school. The resulting sample of 2,019 teachers contained 1,016 elementary school and 1,003 secondary/combined school teachers.

Respondent and Response Rates

A letter and instruction sheet for preparing the list of teachers was sent to the principal of each sampled school in October 1998. The letter introduced the study, requested the principal's cooperation to sample teachers, and asked the principal to prepare a list of teachers that included only full-time teachers. Telephone followup was conducted from November 1998 through March 1999 with principals who did not respond to the initial request for teacher lists. Of the 1,000 schools in the sample, 7 were found to be out of the scope of the survey (no longer in existence), for a total of 993 eligible schools. Teacher lists were provided by 903 schools, or 91 percent of the eligible schools.

Questionnaires were mailed to teachers in March 1999. Telephone followup was conducted from April through June 1999 with teachers who did not respond to the initial questionnaire mailing. Nonresponse followup was suspended in June because a large portion of schools had closed or were closing, and it began again in September 1999. Teachers were sent a reminder flyer at the beginning of their fall 1999 school year informing them that questionnaires would be mailed to them in about 2 weeks. Questionnaires, along with a magnet with the survey name on it to thank teachers for their participation, were remailed to nonrespondents based on when their schools opened in the fall. Data collection was completed in October 1999. Of the 2,019 teachers selected for the sample, 172 were found to be out of the scope of the survey, usually because they were not regular full-time classroom teachers. This left a total of 1,847 eligible teachers in the sample. Completed questionnaires were received from 1,674 teachers, or 91 percent of the eligible teachers. The overall response rate was 83 percent (91 percent for the list collection multiplied by 91 percent for the teacher questionnaire). Weighted item nonresponse rates ranged from 0 percent to 1.1 percent for the items presented in this report. Because item nonresponse was so low, imputation for item nonresponse was not implemented.

Sampling and Nonsampling Errors

The responses were weighted to produce national estimates (see table B-1). The weights were designed to adjust for the variable probabilities of selection and differential nonresponse. The findings in this report are estimates based on the sample selected and, consequently, are subject to sampling variability.

The survey estimates are also subject to nonsampling errors that can arise because of nonobservation (nonresponse or noncoverage) errors, errors of reporting, and errors made in data collection. These errors can sometimes bias the data. Nonsampling errors may include such problems as misrecording of responses; incorrect editing, coding, and data entry; differences related to the particular time the survey was conducted; or errors in data preparation. While general sampling theory can be used in part to determine how to estimate the sampling variability of a statistic, nonsampling errors are not easy to measure and, for measurement purposes, usually require that an experiment be conducted as part of the data collection procedures or that data external to the study be used.

To minimize the potential for nonsampling errors, the questionnaire was pretested with respondents like those who completed the survey. During the design of the survey and the survey pretest, an effort was made to check for consistency of interpretation of questions and to eliminate ambiguous items. The questionnaire and instructions were extensively reviewed by the National Center for Education Statistics and the Office of the Secretary, U.S. Department of Education. Manual and machine editing of the questionnaire responses were conducted to check the data for accuracy and consistency, and cases with missing or inconsistent items were recontacted by telephone. Data were keyed with 100 percent verification.

Table B-1.—Number and percent of responding full-time public school teachers in the study sample and estimated number and percent of full-time public school teachers the sample represents, by school and teacher characteristics: 1999

School and teacher characteristic	Respondent sample		National estimate	
	Number	Percent	Number	Percent
All public school teachers[1]	1,674	100	1,777,940	100
School instructional level[2]				
Elementary	868	54	1,188,974	69
Secondary	738	46	540,264	31
School enrollment size				
Less than 300	194	12	189,946	11
300 to 999	1,025	61	1,172,015	66
1,000 or more	455	27	415,979	23
Locale				
City	445	27	531,055	30
Urban fringe	617	37	667,395	38
Town	275	16	264,875	15
Rural	337	20	314,615	18
Region				
Northeast	313	19	343,093	19
Southeast	388	23	410,159	23
Central	431	26	434,997	25
West	542	32	589,692	33
Percent minority enrollment in school				
Less than 6 percent	466	28	469,677	27
6 to 20 percent	383	23	405,337	23
21 to 49 percent	412	25	446,130	25
50 percent or more	398	24	446,292	25
Percent of public school students in school eligible for free or reduced-price school lunch				
Less than 11 percent	267	16	266,776	15
11 to 30 percent	552	33	573,955	33
31 to 70 percent	587	35	625,966	35
71 percent or more	258	16	300,830	17
Main teaching assignment[3]				
Self-contained classroom	582	42	786,919	44
Math/science	341	25	315,150	21
Other academic subject	463	33	406,733	27
Teaching experience				
3 or fewer years	226	14	249,483	14
4 to 9 years	351	21	376,411	21
10 to 19 years	431	26	462,213	26
20 or more years	662	40	685,402	39

[1]Teachers were full-time public school teachers who taught in any of grades 1 through 12. Only teachers whose main teaching assignment was bilingual education/English as a second language, special education, or vocational education were excluded.
[2]Data for combined schools are not reported as a separate instructional level, because there are very few in the sample. Data for combined schools are included in the totals and in analyses of other school and teacher characteristics.
[3]Teachers were asked to report the field in which they taught the most classes. A self-contained classroom teacher teaches all or most academic subjects to the same group of students all or most of the day (99 percent are elementary teachers). In the other categories, there was a mixture of teachers across instructional level. Forty-three percent of math/science teachers were elementary teachers. The category "other academic subjects" includes English, foreign language, and social studies; 38 percent are elementary teachers. Teachers in other fields (e.g., arts, physical education/health, and technology) are not included as a separate category. They are included in the totals and in analyses of other school and teacher characteristics.
NOTE: Details may not sum to totals because of rounding or missing data. There were very small amounts of missing data for the following variables percent minority enrollment in school (0.6 percent), and percent of students in school eligible for free or reduced-price lunch (0.6 percent). Percents are computed within each classification variable, but may not sum to 100 because of rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, Survey on Teachers' Use of Computers and the Internet, 1999.

Variances and Statistical Procedures

The standard error is a measure of the variability of estimates due to sampling. It indicates the variability of a sample estimate that would be obtained from all possible samples of a given design and size. Standard errors are used as a measure of the precision expected from a particular sample. If all possible samples were surveyed under similar conditions, intervals of 1.96 standard errors below to 1.96 standard errors above a particular statistic would include the true population parameter being estimated in about 95 percent of the samples. This is a 95 percent confidence interval.

For example, the estimated percentage of teachers who feel very well prepared to use computers and the Internet for classroom instruction in class is 10 percent, and the estimated standard error is 0.9 percent. The 95 percent confidence interval for the statistic extends from [10 - (0.9 times 1.96)] to [10 + (0.9 times 1.96)], or from 8.2 to 11.8 percent. Tables of standard errors for each table and figure in the report are provided in Appendix A.

Data from the 1999 FRSS technology survey were analyzed using Stata, a computer program which allows users to calculate nationally representative estimates of proportions and standard errors for those estimates. The proportion estimates were weighted to compensate for unequal probabilities of selection and to adjust for the effects of nonresponse, resulting in estimates that can be projected to the U.S. population of elementary and secondary public school teachers. The standard errors for those estimates were computed through a procedure called Taylor Series approximation. This method is used to take into account the variability introduced into the estimates by using sampling procedures other than random sampling. The resulting variances can then be used in the calculation of the test statistics.

Comparisons that have been made between FRSS 1999 estimates in this report have been tested for statistical significance to ensure that the differences are larger than those that might be expected due to sampling variation. The statistical comparisons were based on the Student's *t*

statistic. Differences between estimates are tested against the probability of a Type I error, or significance level. The significance levels were determined by calculating the Student's *t* values for the differences between each pair of means or proportions and comparing these with published tables of significance levels for two-tailed hypothesis testing. Student's *t* values may be computed to test the difference between estimates with the following formula:

$$t = \frac{(E_1 - E_2)}{(se_1^2 + se_2^2)} \quad (1)$$

where E_1 and E_2 are the estimates to be compared and se_1 and se_2 are their corresponding standard errors. This formula is valid only for independent estimates! When estimates are not independent a covariance term must be added to the formula. If the comparison is between the mean of a subgroup and the mean of the total group, the following formula is used:

$$t = \frac{(E_{tot} - E_{sub})}{(se_{tot}^2 + se_{sub}^2 - 2(p)se_{sub}^2} \quad (2)$$

where *p* is the proportion of the total group contained in the subgroup. When comparing two percentages from a distribution that adds to 100 percent, the following formula is used:

$$t = \frac{(E_1 - E_2)}{(se_1^2 + se_2^2 - 2(r)se_1se_2} \quad (3)$$

where *r* is the correlation between the two estimates. There are hazards in reporting statistical tests for each comparison. First, comparisons based on large *t* statistics may appear to merit special attention. This can be misleading, since the magnitude of the *t* statistic is related not only to the observed differences in means or percentages but also to the number of students in the specific

categories used for comparison. Hence, a small difference compared across a large number of students would produce a large *t* statistic.

A second hazard in reporting statistical tests for each comparison occurs when making multiple comparisons among categories of an independent variable. For example, when making paired comparisons across different racial/ethnic groups, the probability of a Type I error for these comparisons taken as a group is larger than the probability for a single comparison. When more than one difference between groups of related characteristics or "families" are tested for statistical significance, one must apply a standard that assures a level of significance for all of those comparisons taken together. Comparisons were made in this report only when $p < .05/k$ for a particular pairwise comparison, where that comparison was one of k tests within a family. This guarantees both that the individual comparison would have $p < .05$ and that for k comparisons within a family of possible comparisons, the significance level for all the comparisons will sum to $p < .05$.[2] Therefore, to guard against errors of inference based on multiple comparisons, Bonferroni-adjusted significance testing was used for each set of comparisons presented in this report, as appropriate.

Definitions of Analysis Variables

School instructional level. Schools were classified according to their grade span in the Common Core of Data (CCD).

- **Elementary school**—lowest grade less than or equal to grade 3 and highest grade less than or equal to grade 8.
- **Secondary** school—lowest grade higher than or equal to grade 7 and highest grade 7 or higher.

School enrollment size. Total number of students enrolled as defined by the Common Core of Data (CCD).

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[1] U.S. Department of Education, National Center for Education Statistics, *A Note from the Chief Statistician,* No. 2, 1993.

[2] The standard that $p<.05/k$ for each comparison is more stringent than the criterion that the significance level of the comparisons should sum to $p<.05$. For tables showing the *t* statistic required to ensure that $p<.05/k$ for a particular family size and degrees of freedom, see Olive Jean Dunn, "Multiple Comparisons Among Means," *Journal of the American Statistical Association* 56 (1961): 52–64.

- Less than 300 students
- 300 to 999 students
- 1,000 or more students

Locale. As defined in the Common Core of Data (CCD).

- **City**—central city of a Metropolitan Statistical Area (MSA).
- **Urban fringe**—a place within an MSA of a central city, but not primarily its central city.
- **Town**—a place not within an MSA, but with a population greater than or equal to 2,500 and defined as urban by the U.S. Bureau of the Census.
- **Rural**—a place with a population less than 2,500 and defined as rural by the U.S. Bureau of the Census.

Percent minority enrollment in the school. The percent of students enrolled in the school whose race or ethnicity, based on data in the 1995-96 CCD file, is classified as one of the following: American Indian or Alaskan Native, Asian or Pacific Islander, black, or Hispanic. Data on this variable were missing for 0.4 percent of the teachers. The break points used for analysis were based on empirically developed quartiles from the weighted survey data.

- Less than 6 percent
- 6 to 20 percent
- 21 to 50 percent
- More than 50 percent

Percent of students at the school eligible for free or reduced-price lunch. This was based on information collected from the school during the teacher list collection phase; if it was missing from the list collection, it was obtained from the CCD file, if possible. Data on this variable were missing for 0.2 percent of the teachers. This item served as the measurement of the concentration of poverty at the school. The break points used for analysis were based on the breaks used for the 1999 FRSS Internet Access in U.S. Public Schools Survey.

- Less than 11 percent

- 11 to 30 percent
- 31 to 49 percent
- 50 to 70 percent
- 71 percent or more

Teaching experience. Total years of teaching experience, based on responses to question 14 on the survey questionnaire.

- 3 or fewer years
- 4 to 9 years
- 10 to 19 years
- 20 or more years

It is important to note that many of the school and teacher characteristics used for independent analyses may also be related to each other. For example, enrollment size and instructional level of schools are related, with secondary schools typically being larger than elementary schools. Similarly, poverty concentration and minority enrollment are related, with schools with a high minority enrollment also more likely to have a high concentration of poverty. Other relationships between analysis variables may exist. Because of the relatively small sample size used in this study, it is difficult to separate the independent effects of these variables. Their existence, however, should be considered in the interpretation of the data presented in this report.

Teacher Access to Computers and the Internet at Home and School

The data reported in this publication represent all regular full-time public school teachers. Less than 1 percent of these teachers reported that they did not have access to computers or the Internet either at home or at school (table B-2). More than half of all teachers reported they had access to both a computer and the Internet at school and at home.

Background Information

The survey was performed under contract with Westat, using the Fast Response Survey System (FRSS). Westat's Project Director was Elizabeth Farris, and the Survey Manager was

Cassandra Rowand. Shelley Burns was the NCES Project Officer. NCES requested the survey with support from Linda Roberts, Office of the Secretary, U.S. Department of Education.

Table B-2.—Percent of full-time public school teachers reporting their level of access to computers and the Internet at home, by school level access: 1999

School access to a computer and the Internet	Home access to a computer and the Internet			
	Both computer and the Internet	Internet only	Computer only	Neither
Both computer and the Internet	58	*	18	15
Internet only	0	0	0	0
Computer only	5	0	2	2
Neither	*	0	*	*

*Less than 1 percent.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, Survey on Teachers' Use of Computers and the Internet, 1999.

Analysis of Data from the National Assessment of Educational Progress (NAEP)

The Nation's Report Card, the National Assessment of Educational Progress (NAEP), is a congressionally mandated project of NCES and the Department of Education. Since 1969, assessments have been conducted periodically in reading, mathematics, science, and other subject areas. In addition to assessing academic performance in these areas, these surveys also collect background information from students, teachers, and school administrators. As part of the collection of background information, respondents are asked questions on special topics, such as the availability and use of computers in their schools.

Data on the availability and use of technology in public schools were drawn from the following administrations to calculate the NAEP estimates presented in this report: 1990 math and reading assessments; 1992 math and reading assessments; 1994 reading assessment; 1996 math and science assessments; and 1998 reading assessment. Information on the sampling and survey methods used is available in the technical report for each administration.[3]

Data from the NAEP surveys were analyzed using SAS (Statistical Analysis System), a computer program similar to Stata, which allows users to calculate nationally representative estimates

[3] See Phillips and Johnson (1991); Gorman (1994); Allen, Kline and Zelenal (1997); Ballator (1997); and Calderone, Horkay, and King (1997).

of proportions and standard errors for those estimates. SAS computes standard errors through a procedure called jackknife replication. This method, like Stata's Taylor Series procedure, is used to take into account the variability introduced into the estimates by using sampling procedures other than random sampling. The resulting variances can then be used in testing differences among the proportion estimates. All comparisons made between the NAEP estimates presented in this report were tested with Bonferroni-adjusted *t*-tests of the difference between mean proportions.

Analysis of Data from the Current Population Survey (CPS)

The Current Population Survey (CPS) is a monthly survey conducted by the Bureau of the Census to collect data on employment and other characteristics of the civilian noninstitutionalized population. Since the mid-1960s, NCES has funded a supplemental survey each year, to collect information on education-related topics, including computer use and access.

Data collected from teachers and adults in other occupations[4] on the availability and use of technology in their homes were drawn from the following surveys to calculate the CPS estimates presented in this report: November, 1994; October, 1997; and December, 1998. Information on the sampling and survey methods used is available on the CPS Web site.[5] Nationally representative estimates are calculated by summing the products of the variable of interest (e.g., a computer in the household) by the final CPS person weights for all persons having the desired characteristic (e.g., elementary or secondary teachers).

The standard error for an estimated CPS proportion is derived from the following formula:

$$S_{x,y} = \mathrm{SQRT}\left[\left(a \right) / \left(y \right) \right] p(1-p) \right] \qquad (4)$$

[4] Adults in other occupations includes all survey respondents who reported a profession which was not elementary or secondary teacher.

[5] See http://www.bls.census.gov/cps/cpsmain.htm

where b is a parameter determined by the Census Bureau and provided on the CPS Web site; y is the estimated number of persons in the base; and p is the estimated proportion.

Estimates of the CPS proportions provided in this report were calculated using Stata. Standard errors were calculated by using the formula listed above. Any comparisons made between CPS estimates were tested with Bonferroni-adjusted t-tests of the difference between mean proportions.

This report was reviewed by the following individuals:

Outside NCES

- David Malouf, Office of Special Education Programs, U.S. Department of Education
- Diane Reed, Office of Educational Technology, U.S. Department of Education
- Linda Roberts, Office of Educational Technology, U.S. Department of Education
- Jeff Rodamer, Planning and Evaluation Services, U.S. Department of Education
- Mary Schifferli, Office for Civil Rights, U.S. Department of Education

Inside NCES

- Ellen Bradburn, Early Childhood, International, and Crosscutting Studies Division
- Shelley Burns, Early Childhood, International, and Crosscutting Studies Division
- Bernie Greene, Early Childhood, International, and Crosscutting Studies Division
- Edith McArthur, Early Childhood, International, and Crosscutting Studies Division
- Marilyn McMillen, Chief Statistician
- Larry Ogle, Assessment Division

- Valena Plisko, Associate Commissioner, Early Childhood, International, and Crosscutting Studies Division
- John Ralph, Early Childhood, International, and Crosscutting Studies Division
- Carl Schmitt, Elementary/Secondary and Libraries Studies Division

For more information about the Fast Response Survey System (FRSS), contact Shelley Burns, Early Childhood, International, and Crosscutting Studies Division, National Center for Education Statistics, Office of Educational Research and Improvement, U.S. Department of Education, 1990 K Street, NW, Washington, DC 20006-5650, e-mail: Shelley_Burns@ed.gov, telephone (202) 502-7348. For more information about the Survey on Teachers' Use of Computers and the Internet, contact Edith McArthur, Early Childhood, International, and Crosscutting Studies Division, National Center for Education Statistics, Office of Educational Research and Improvement, U.S. Department of Education, 1990 K Street, NW, Washington, DC 20006-5650, e-mail: Edith_McArthur@ed.gov, telephone (202) 502-7393.

Appendix C

Survey Questionnaire

U.S. DEPARTMENT OF EDUCATION NATIONAL CENTER FOR EDUCATION STATISTICS WASHINGTON, D.C. 20208-5651 **Public School Teachers Use of Computers and the Internet** FAST RESPONSE SURVEY SYSTEM	FORM APPROVED O.M.B. NO.: 1850-0733 EXPIRATION DATE: 07/1999
This survey is authorized by law (20 U.S.C. 1221e-1). While you are not required to respond, your cooperation is needed to make the results of this survey comprehensive, accurate, and timely.	

DEFINITIONS:

E-mail (Electronic mail) – Refers to text messages transmitted across networks and usually accessible only by the addressee.
Distance learning – Refers to the transmission of information from one geographic location to another via various modes of telecommunications technology.
Multimedia – Refers to the use of a computer to produce any combination of text, full color images and graphics, video, animation, and sound.
Self-contained classroom teacher – Teaches all or most academic subjects to the same group of students all or most of the day.

LABEL

IF ABOVE INFORMATION IS INCORRECT, PLEASE MAKE CORRECTIONS DIRECTLY ON LABEL.

Name of person completing form:_____ Telephone:_____

Title/position:_____ Number of years at this school: _____

Best days and times to reach you (in case of questions):_____

E-mail:_____

PLEASE RETURN COMPLETED FORM TO:	IF YOU HAVE ANY QUESTIONS, CONTACT:
WESTAT ATTN: Rowand, 716610 1550 Research Boulevard Rockville, Maryland 20850	Cassandra Rowand 800-937-8281, ext. 2247 Fax: 800-254-0984 E:mail: rowandc1@westat.com

According to the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information is 1850-0733. The time required to complete this information collection is estimated to average 30 minutes per response, including the time to review instructions, search existing data resources, gather the data needed, and complete and review the information collected. If you have any comments concerning the accuracy of the time estimate(s) or suggestions for improving this form, please write to: U.S. Department of Education, Washington, D.C. 20202-4651. If you have comments or concerns regarding the status of your individual submission of this form, write directly to: National Center for Education Statistics, 555 New Jersey Avenue, N.W., Washington, D.C. 20208

FRSS Form No. 70, 3/1999

1a. How many computers (including laptops available on a daily basis) are located in your classroom? _____

1b. How many of these are used for instruction? _____

1c. How many of the computers located in your classroom currently have access to the Internet? _____

1d. How many of the computers not currently connected to the Internet are capable of being connected? _____

2. Do you use computers or the Internet for instruction during class time? Yes..... 1 No 2

3. Do you assign projects that require **your students** to use a computer:

   a. Inside the classroom? Yes..... 1 No 2
   b. Outside the classroom? Yes..... 1 No 2

4. Approximately, what percentage of **your students** have access to a computer **at home**? _____ percent

Because your responses to questions 5 and 6 may be different for different classes/sections you teach, please select a single class/section to use in your responses to questions 5 and 6. The class you select should represent a **typical class** you teach in your main subject area.

5. To what extent do you assign **students in your typical class**, work that involves using computers or the Internet in the following ways? *(If your school does not have these capabilities please circle 5.)*

	Not at all	Small extent	Moderate extent	Large extent	NA
a. Practice drills	1	2	3	4	5
b. Solve problems/analyze data	1	2	3	4	5
c. Use computer applications such as word processing, spreadsheets, etc	1	2	3	4	5
d. Graphical presentation of materials	1	2	3	4	5
e. Demonstrations/simulations	1	2	3	4	5
f. Produce multimedia reports/projects	1	2	3	4	5
g. Research using CD-ROM	1	2	3	4	5
h. Research using the Internet	1	2	3	4	5
i. Correspond with experts, authors, students from other schools, etc., via e-mail or Internet	1	2	3	4	5

6. On average, how frequently do **students in your typical class** use each of the following during class time?

	Not at all	Rarely	Sometimes	Often
a. Computers in the classroom	1	2	3	4
b. Computers in a computer lab or library/media center	1	2	3	4
c. Internet from the classroom	1	2	3	4
d. Internet from a computer lab or library/media center	1	2	3	4
e. Distance learning via the Internet	1	2	3	4
f. Distance learning via other modes of interactive media	1	2	3	4
g. Graphing calculators	1	2	3	4

Because teachers use computers and the Internet in different ways, questions 7 and 8 refer to the way in which **you** use computers and the Internet.

7. Are the following available to you, and if yes, to what extent do **you** use them?

	Available		If available, extent of use			
	Yes	No	Not at all	Small extent	Moderate extent	Large extent
a. Computers in your classroom	1	2	1	2	3	4
b. Computers elsewhere in the school (e.g., library, computer lab)	1	2	1	2	3	4
c. Computers at home	1	2	1	2	3	4
d. Internet in your classroom	1	2	1	2	3	4
e. Internet elsewhere in the school (e.g., library, computer lab)	1	2	1	2	3	4
f. Internet at home	1	2	1	2	3	4
g. E-mail at school	1	2	1	2	3	4
h. School network through which you can access the Internet from home	1	2	1	2	3	4

i. Telephone in your classroom..... 1 2 | 1 2 3 4

8. For each objective listed below, please indicate how much **you** use computers or the Internet at school and at home to accomplish this goal.

	At school			At home		
	Not at all	A little	A lot	Not at all	A little	A lot
a. Create instructional materials (i.e., handouts, tests, etc.).....	1	2	3	1	2	3
b. Gather information for planning lessons.....	1	2	3	1	2	3
c. Access model lesson plans	1	2	3	1	2	3
d. Access research and best practices for teaching	1	2	3	1	2	3
e. Multimedia presentations for the classroom	1	2	3	1	2	3
f. Administrative record keeping (i.e., grades, attendance, etc.)	1	2	3	1	2	3
g. Communicate with colleagues/other professionals	1	2	3	1	2	3
h. Communicate with students' parents.....	1	2	3	1	2	3
i. Communicate with student(s) outside the classroom/ classroom hours.....	1	2	3	1	2	3
j. Post homework or other class requirements or project information	1	2	3	1	2	3
k. Other *(specify)* _____	1	2	3	1	2	3

9. In your opinion, how well prepared are **you** to use computers and the Internet for classroom instruction?

Not at all prepared..... 1 Somewhat prepared.... 2 Well prepared..... 3 Very well prepared..... 4

10. To what extent have each of the following prepared **you** to use computers and the Internet?

	Not at all	Small extent	Moderate extent	Large extent
a. College/graduate work.....	1	2	3	4
b. Professional development activities	1	2	3	4
c. Colleagues.....	1	2	3	4
d. Students.....	1	2	3	4
e. Independent learning.....	1	2	3	4

11. How many hours of formal professional development **in the use of computers and the Internet** did you participate in during the last 3 years?

0 hours..... 1
1-8 hours..... 2
9-32 hours..... 3
More than 32 hours 4

12. Does your school or district:

	Yes	No
a. Require technology training for teachers?.....	1	2
b. Encourage technology training with incentives?.....	1	2
c. Leave it up to teachers to initiate participation?	1	2

13. Does your state, district, or school make the following types of training available to you and, if yes, have you ever participated in these programs?

	Available?			Participated?	
	Yes	No	Don't know	Yes	No
a. Use of computers/basic computer training.....	1	2	3	1	2
b. Software applications	1	2	3	1	2
c. Use of the Internet.....	1	2	3	1	2
d. Use of other advanced telecommunications (e.g., interactive audio, video, closed-circuit TV).....	1	2	3	1	2
e. Integration of technology into the curriculum/classroom instruction	1	2	3	1	2
f. Followup and/or advanced training	1	2	3	1	2

14. Which of the following types of incentives are available to you for participation in training to use computers or the Internet?

	Yes	No	Don't know
a. School provides release time from classes or other responsibilities	1	2	3
b. Expenses are paid (e.g., tuition, travel, books)	1	2	3
c. Stipends are provided	1	2	3
d. Course credit toward certification is offered	1	2	3
e. Connection to the Internet from home through your school's network	1	2	3
f. Additional resources for you or your classroom (e.g. computers, software, etc.)	1	2	3
g. Other (*specify*) _____	1	2	3

15. Is there a "technology coordinator" (i.e., someone on the school or district staff who coordinates teachers' instructional use of computers and helps you or other teachers use computers) at your school?

Yes..... 1 No..... 2

16. Please indicate who at your school provides computer-related assistance to you for each of the following? *(Circle all that apply.)*

	Use of computers	Use of the Internet	Technical support	Integrating technology	Locating software
a. Technology coordinator	1	2	3	4	5
b. Library/media specialist	1	2	3	4	5
c. Classroom teacher	1	2	3	4	5
d. No assistance provided	1	2	3	4	5
e. Other *(specify)* _____	1	2	3	4	5

17. Please indicate to what extent, if any, each of the following are barriers to your use of school computers or the Internet for instruction.

	Not a barrier	Small barrier	Moderate barrier	Great barrier
a. Not enough computers	1	2	3	4
b. Outdated, incompatible, or unreliable computers	1	2	3	4
c. Internet access is not easily accessible	1	2	3	4
d. Lack of good instructional software	1	2	3	4
e. Inadequate training opportunities	1	2	3	4
f. Lack of release time for teachers to learn/practice/ plan ways to use computers or the Internet	1	2	3	4
g. Lack of administrative support	1	2	3	4
h. Lack of support regarding ways to integrate telecommunications into the curriculum	1	2	3	4
i. Lack of technical support or advice	1	2	3	4
j. Lack of time in schedule for students to use computers in class	1	2	3	4
k. Concern about student access to inappropriate materials	1	2	3	4
l. Lack of funding	1	2	3	4
m. Other *(specify)* _____	1	2	3	4

18. Does your school or district have a policy or procedures in place that limit student access to inappropriate material on the Internet? Yes ..... 1 No 2

19. Including this school year, how many years have you been employed as a teacher? _____ Years
(Include years spent teaching both full and part time and in public and private schools.)

20. What grade(s) do you currently teach at this school? *(Circle all that apply.)*

PK K 1 2 3 4 5 6 7 8 9 10 11 12 Ungraded

21. What is your main teaching assignment (the field in which you teach the most classes)? *(Circle one.)*

a. **Self-contained** (see definition on cover)..... 1
b. English/language arts 2
c. Mathematics..... 3
d. Science 4
e. Social studies/social science 5
f. Foreign language..... 6
g. Arts (e.g., visual arts, music, drama, etc.) 7
h. Technology/computer science..... 8
i. PE/Health..... 9
j. Other (*specify*) _____ 10

Thank you.