Chapter 3

Availability of Technology For Instructional Purposes

Highlights

- The availability of educational technology increased substantially during the 1990s, particularly at the school level. By 1999, most teachers reported having at least one computer in their classrooms, and over half of these teachers also had access to the Internet in their classrooms. Additionally, the majority of teachers also reported having these technologies available at home.

- Despite the gains in computer and Internet availability at school and in classrooms, approximately one-third of teachers reported that their classrooms had a single computer or a single computer connected to the Internet available in 1999. In addition, the availability of technology was not equally distributed among schools with different characteristics. For example, teachers in schools with lower minority enrollments were generally more likely than teachers in schools with the highest minority enrollments to report having the Internet available in the classroom. Additionally, teachers in schools with lower poverty concentrations (based on the percent of students eligible for free or reduced-lunch) were generally more likely than teachers in schools with high minority concentrations to report having the Internet available in the classroom.

- In 1999, the availability of technology in the classroom was related to teachers' use of that technology. For example, teachers who reported having more than five computers in their classrooms were more likely than teachers with fewer classroom computers to report using computers a lot for various preparatory activities. Additionally, teachers who had more computers available in the classroom were generally more likely to report assigning students to use computers or the Internet to a large extent to conduct various tasks (e.g., solve problems or analyze data).

CHAPTER 3

Availability of Technology for Instructional Purposes

This chapter reviews data collected by several surveys on the availability of education technology to teachers and their students. The chapter begins with background information on computer availability from the National Assessment of Educational Progress (NAEP) school surveys, as well as from the Fast Response Survey System (FRSS) school survey, NAEP teacher survey, and the Current Population Survey (CPS) from 1994 to 1998. Data are also provided from the 1994 to 1999 FRSS school surveys on the percent of schools and instructional rooms with Internet connections. This background information is followed by more recent, detailed findings on the technology available to teachers and their students, taken from the 1999 FRSS survey on teachers' use of technology. Included are differences in the availability of computers and Internet connections by characteristics of schools (e.g., instructional level, location of school, poverty concentration).

Availability of Computers and the Internet: 1990 to 1999

Measures of computer availability come in a variety of forms, including the percent of students who have varying numbers of computers available to them in their schools (NAEP), student-to-computer ratios in schools (FRSS), the percent of students who have computer labs and portable computers available to them (NAEP), the percent of students who have computers permanently available in the classroom (NAEP), and the percent of students for whom computers are best described as available in computer labs or available in the classroom (NAEP). Measures of Internet availability in public schools are similar, but typically focus on the percent of schools connected to the Internet rather than on the percent of students with the Internet available to them. These measures include the percent of schools connected to the Internet

(FRSS), the percent of instructional rooms connected to the Internet (FRSS), and student-to-instructional-computers-with-Internet ratios in schools (FRSS).

Computer Availability : 1990 to 1999

Number of computers available to students and student-to-computer ratios. Beginning in 1990, NAEP began collecting data from school administrators on the number of computers available to students in the school. Results from these surveys demonstrate a substantial increase in the number of computers available to public school students in their schools between 1990 and 1999 (figure 3.1). For example, the percent of fourth-grade students who had more than 76 computers available in their schools rose from 1 percent in 1990 to 33 percent in 1998. Similarly, there was an increase from 8 percent to 51 percent of eighth-grade students and from 42 percent to 73 percent of twelfth-grade students during those years. According to recent FRSS data, approximately one computer was available for every six students in 1999 (Williams, 2000).

Computer availability in labs and classrooms. Data are also available from the NAEP 1998 school survey on the location of computers in the school. For example, administrators indicated if the school had computer labs and whether computers were always available in classrooms. Additionally, administrators were asked if computers were available to be brought to classrooms for student use as a measure of portable computer availability.

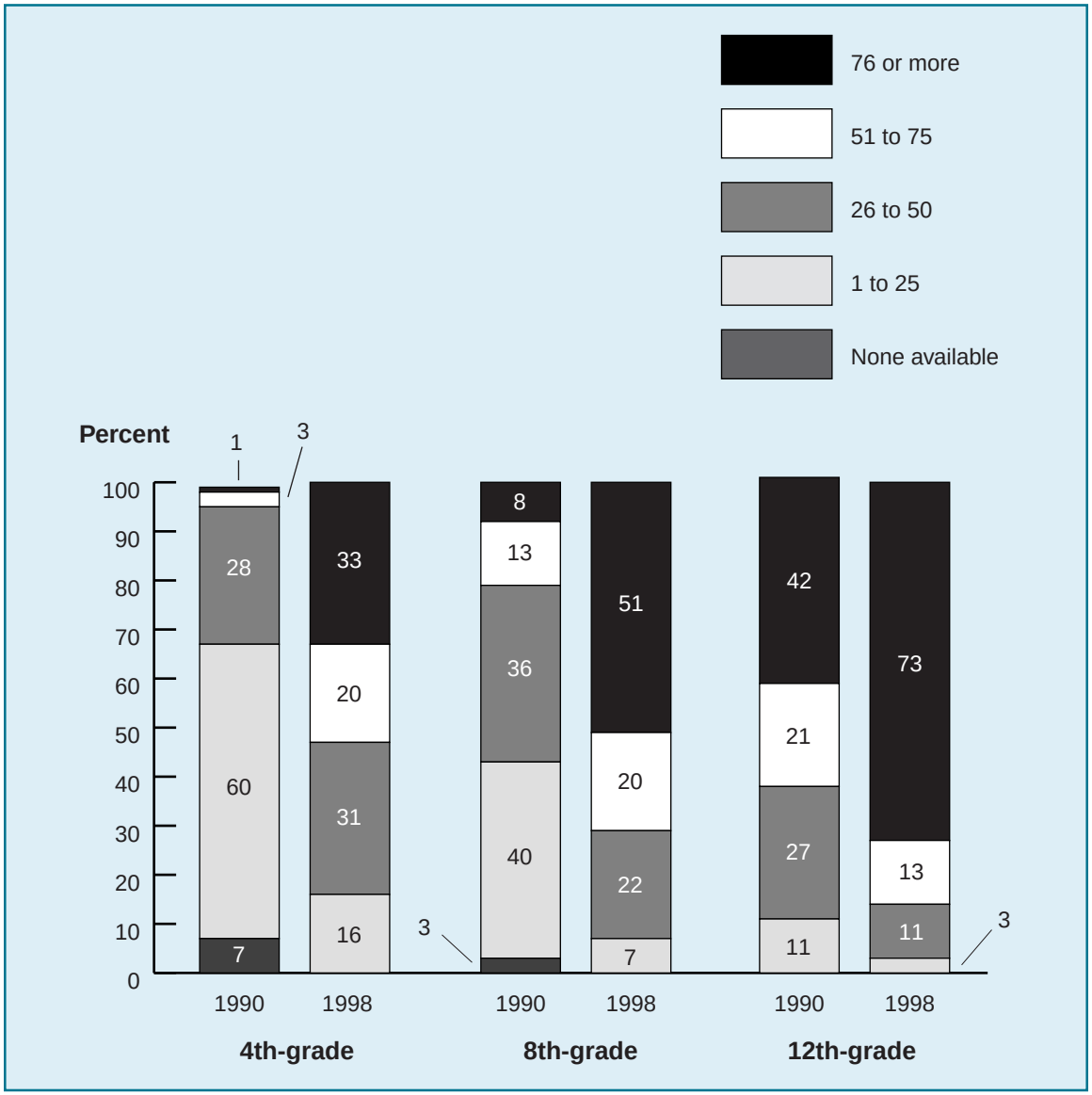
The different types of computer availability (e.g., labs, available to be brought to class, classrooms) varied by grade-level in 1998. For example, among public school students, eighth and twelfth-grade students were more likely than fourth-grade students to have computer labs available (90 percent and 94 percent, respectively, compared with 78 percent—figure 3.2). Conversely, fourth-grade students were more likely to have computers always available in the classroom than eighth and twelfth-grade students (83 percent compared with 46 percent and 27 percent, respectively).

Teachers' reports of computer availability to students. In 1998, public school teachers of fourth- and eighth-grade students were asked to best describe the availability of computers for use by their students. Teachers reported whether: computers were "not available to students anywhere," computers for student use were "available in a lab," or varying numbers of computers for student use were "available in class." According to their teachers, the majority of both fourth-grade and eighth-grade students had computers available to them somewhere in their school in 1998, either in the classroom or elsewhere in the school (figure 3.3). Specifically, 72 percent of fourth-grade students and 49 percent of eighth-grade students had at least one computer in their classrooms, and 23 percent of fourth-grade students and 42 percent of eighth-grade students had at least one computer available in lab. Thus, 5 percent of fourth-graders and 9 percent of eighth-graders did not have computers available in their schools.

Internet Availability: 1994 to 1999

The FRSS also collected data on the percent of public schools and instructional rooms that were connected to the Internet as part of its school surveys between 1994 and 1999. Internet

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

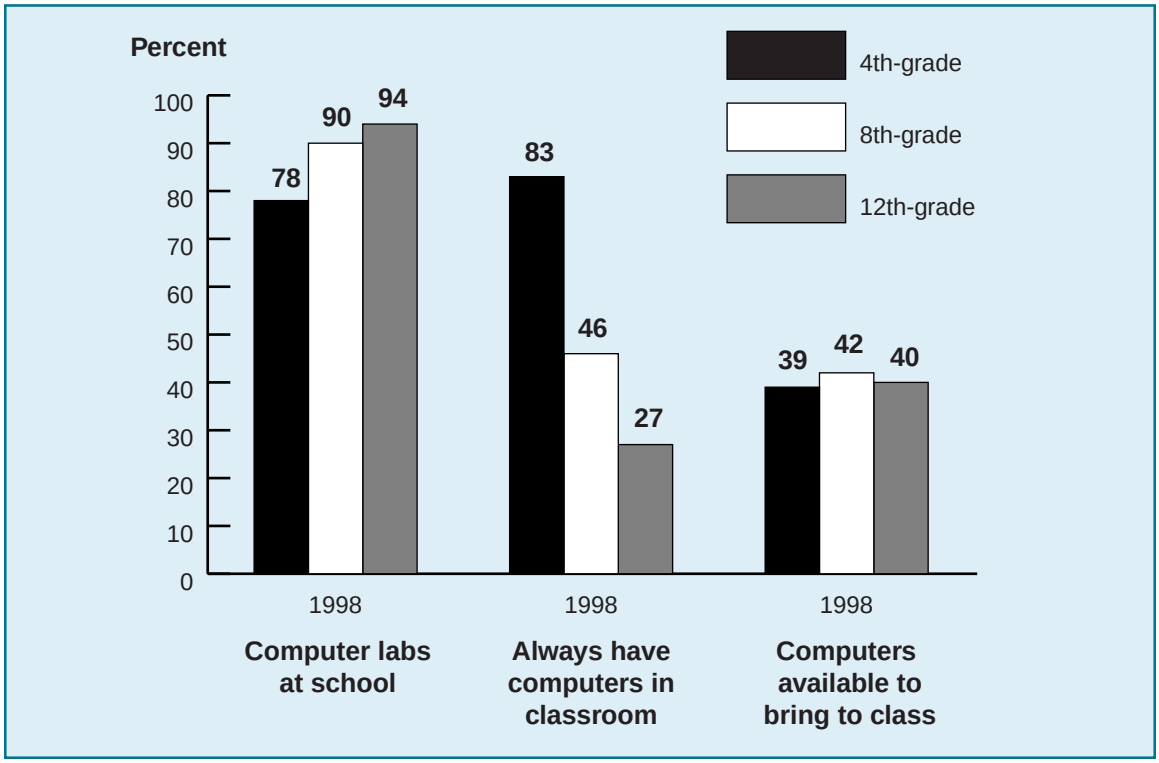


NOTE: Detail may not sum to 100 due to rounding.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1990 and 1998 Reading Assessments.

availability in schools and instructional rooms increased steadily during that time (Williams, 2000—figure 3.4). In 1994, a little over a third of all public schools were connected to the Internet. By 1999, availability had grown to 95 percent, with one computer connected to the Internet for every 9 students. The percent of instructional rooms connected to the Internet grew even more sharply during that time—whereas 3 percent of instructional rooms were connected to the Internet in 1994, 63 percent were connected by 1999.

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



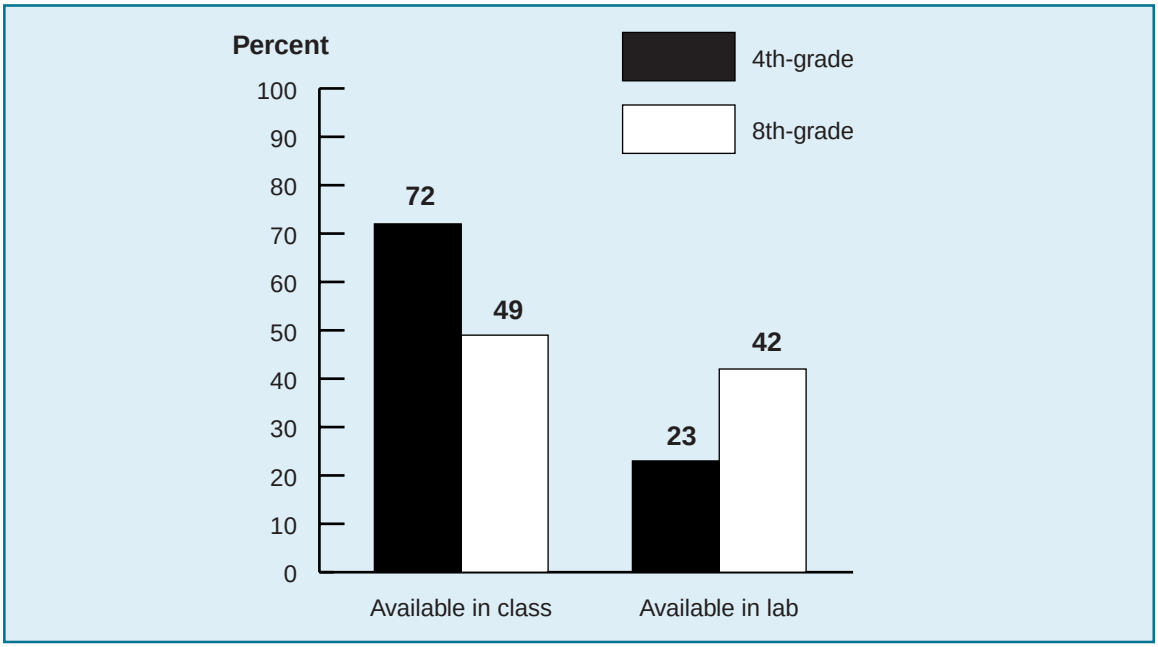
SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1998 Reading Assessments.

Differences in the Growth of Availability

Despite the gains made by public schools in obtaining computers and Internet connectivity, not all schools had made the same progress by 1999 (Williams, 2000). The 1999 FRSS data indicate differences in student-to-instructional-computer ratios by such school characteristics as enrollment size, location, poverty concentration, and minority enrollments. For example, the smallest schools had a lower student-to-instructional-computer ratio than medium and large schools (4 compared with 6 each), as well as a lower student-to-instructional-computer-with-Internet ratio (6 compared with 9 and 10, respectively—figure 3.5). Rural schools had a lower student-to-instructional-computer ratio than schools in other locations (4 compared with 6 each for schools located in urban fringes, cities, and towns). Furthermore, rural schools had lower student-to-instructional-computer-with-Internet ratios than urban fringe and city schools (7 compared with 9 and 11, respectively).

Additionally, there were differences in student-to-instructional-computer ratios by poverty concentration and minority enrollments in 1999. Higher poverty schools (31 to 49 percent of students eligible for free or reduced-price lunch) had more students per instructional computer

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



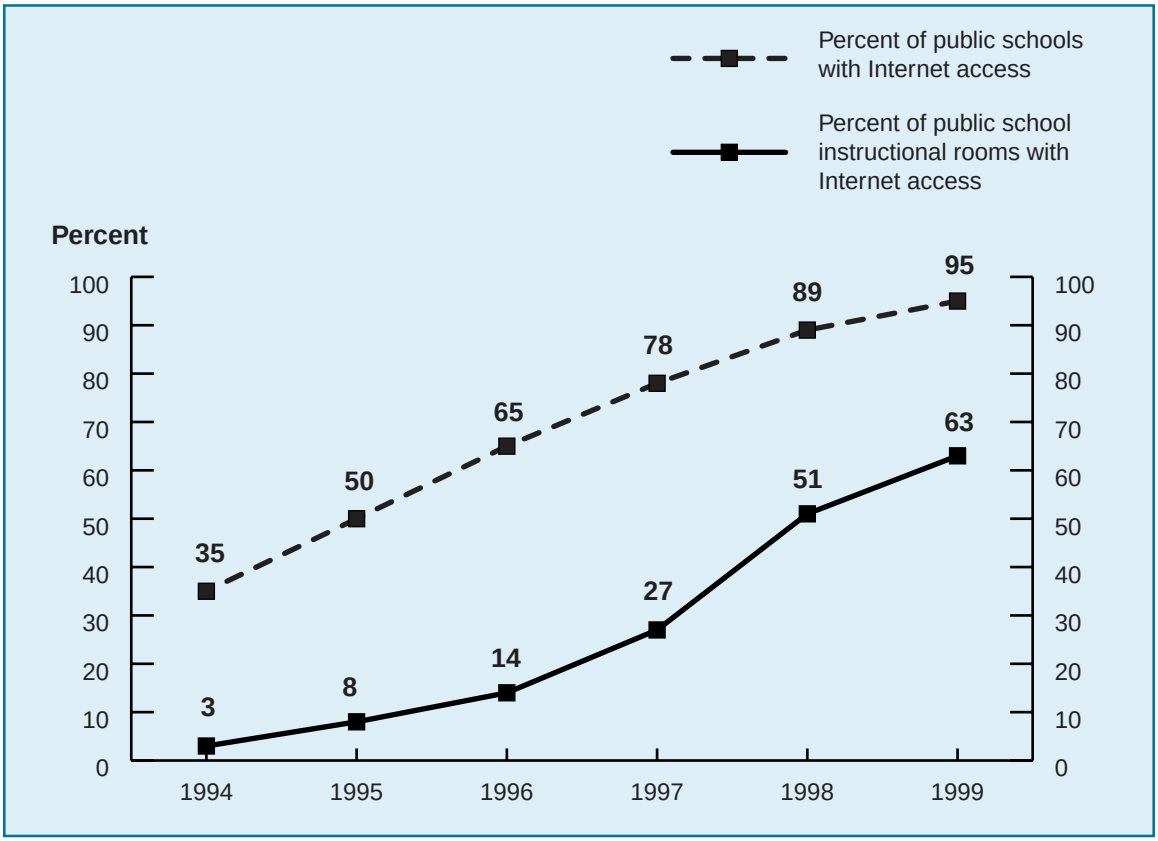
SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1998 Reading Assessments.

than lower poverty schools (11 to 30 percent and less than 11 percent of students eligible for free or reduced-price lunch—6 compared with 5 each). Similarly, schools with the highest minority enrollments had a higher student-to-instructional-computer ratio than schools with lower minority enrollments (6 to 20 percent or less than 6 percent minority enrollments—6 compared with 5 each).

Differences by poverty concentration and minority enrollments were also present in student-to-instructional-computer-with-Internet ratios. Schools with more than 70 percent of students eligible for free or reduced-price lunch had more students per instructional computer with Internet than schools with lower poverty concentrations (31 to 49 percent, 11 to 30 percent, and less than 11 percent—16 compared with 9, 8, and 7, respectively). Similarly, schools with the highest minority enrollments had a higher student-to-instructional-computer-with-Internet ratio than schools with lower minority enrollments (21 to 49 percent, 6 to 20 percent, and less than 6 percent—13 compared with 9, 8, and 7, respectively).

The highest poverty schools were also less likely to report having instructional rooms connected to the Internet than several other groups in 1997 and 1998 (Rowand, 1999; Williams, 2000—figure 3.6). Between 1998 and 1999, all schools except those with the highest poverty concentrations reported an increase in the percentage of instructional rooms connected to the Internet. In 1999, 39 percent of instructional rooms at schools with more than 70 percent of students eligible for free or reduced-price lunch were connected to the Internet, compared with 62 to 74 percent of schools with lower concentrations of poverty.

FIGURE 3.4.—PERCENT OF PUBLIC SCHOOLS AND INSTRUCTIONAL ROOMS WITH INTERNET ACCESS: 1994 TO 1999



SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Advanced Telecommunications in Public Schools, K-12," FRSS 51, NCES 95-731; "Advanced Telecommunications in U.S. Public Elementary and Secondary Schools, 1995," FRSS 57, NCES 96-854; "Advanced Telecommunications in U.S. Elementary and Secondary Public Schools, Fall 1996," FRSS 61, NCES 97-944; "Internet Access in Public Schools," FRSS 64, NCES 98-031; "Survey on Internet Access in U.S. Public Schools, Fall 1998," FRSS 69, 1998; and "Internet Access in U.S. Public Schools and Classrooms: 1994-99," FRSS 75, NCES 2000-086.

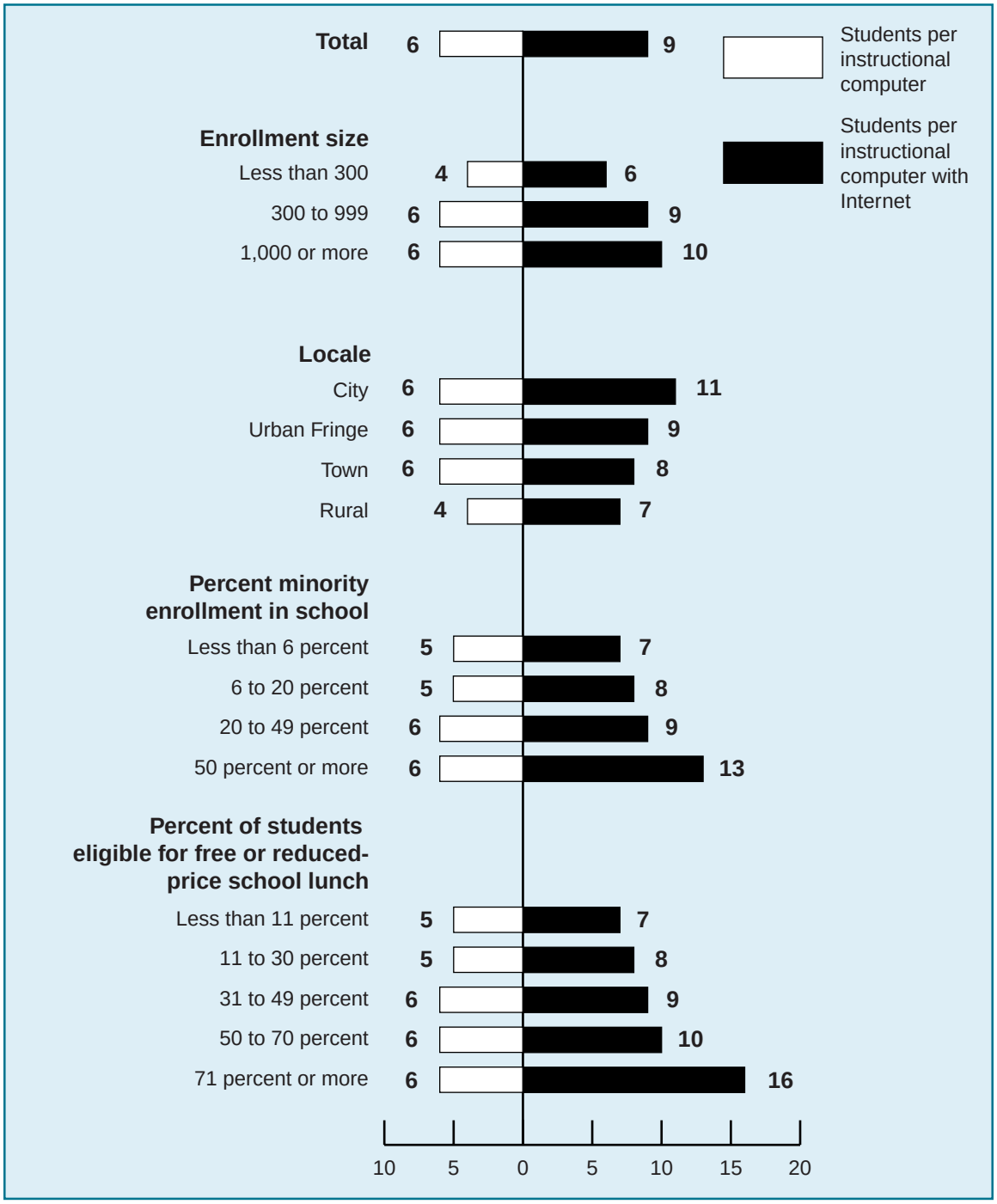
Availability of Computers at Home: 1994 to 1998

Data are also available on the presence of computers in public and private school teachers' and students' homes, collected as part of the CPS. The following sections describe the growth in the availability of home computers among elementary and secondary public and private school teachers and students between 1994 and 1998. The availability of computers in teachers' homes is compared with that of adults in other occupations, and the number and ages of computers in the home are also given for the most recent year (1998).

Teachers' Computer Availability at Home

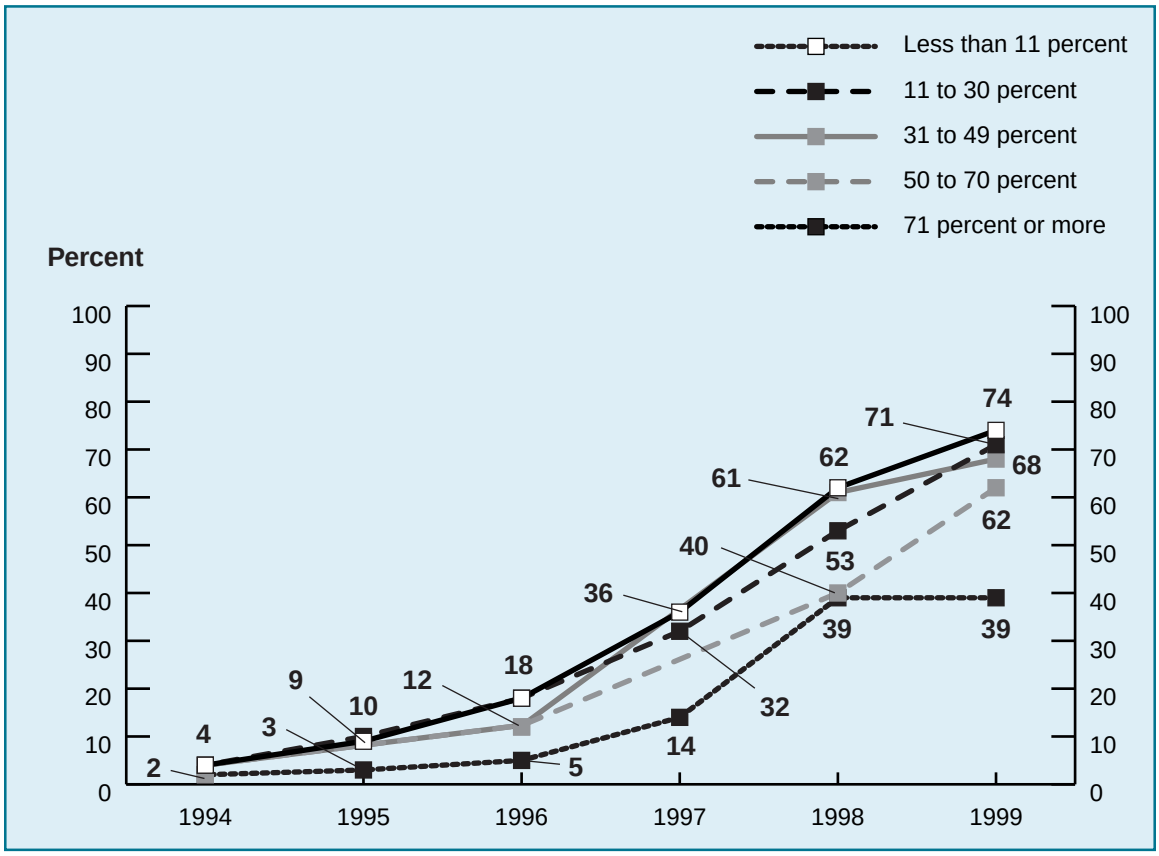
Results from the 1994 to 1998 CPS indicate that the availability of computers in public and private school teachers' homes increased significantly between 1994 and 1998 (54 percent compared with 74 percent). Furthermore, elementary and secondary teachers were more likely to have a computer at home than adults in all other occupations in 1994 through 1998 (e.g., 74 percent compared with 46 percent in 1998—figure 3.7). The majority of adults who had a

FIGURE 3.5.—RATIO OF STUDENTS PER INSTRUCTIONAL COMPUTER AND STUDENTS PER INSTRUCTIONAL COMPUTER WITH INTERNET ACCESS, BY SCHOOL CHARACTERISTICS: 1999



SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Survey on Internet Access in U.S. Public Schools, Fall 1999," FRSS 75, 1999.

FIGURE 3.6.—-PERCENT OF PUBLIC SCHOOL INSTRUCTIONAL ROOMS WITH INTERNET ACCESS, BY FREE OR REDUCED-PRICE LUNCH ELIGIBILITY: 1994 TO 1999



NOTE: In 1995 and 1997 the 31 to 49 percent and 50 to 70 percent categories were collapsed. Separate estimates are unavailable for those years.

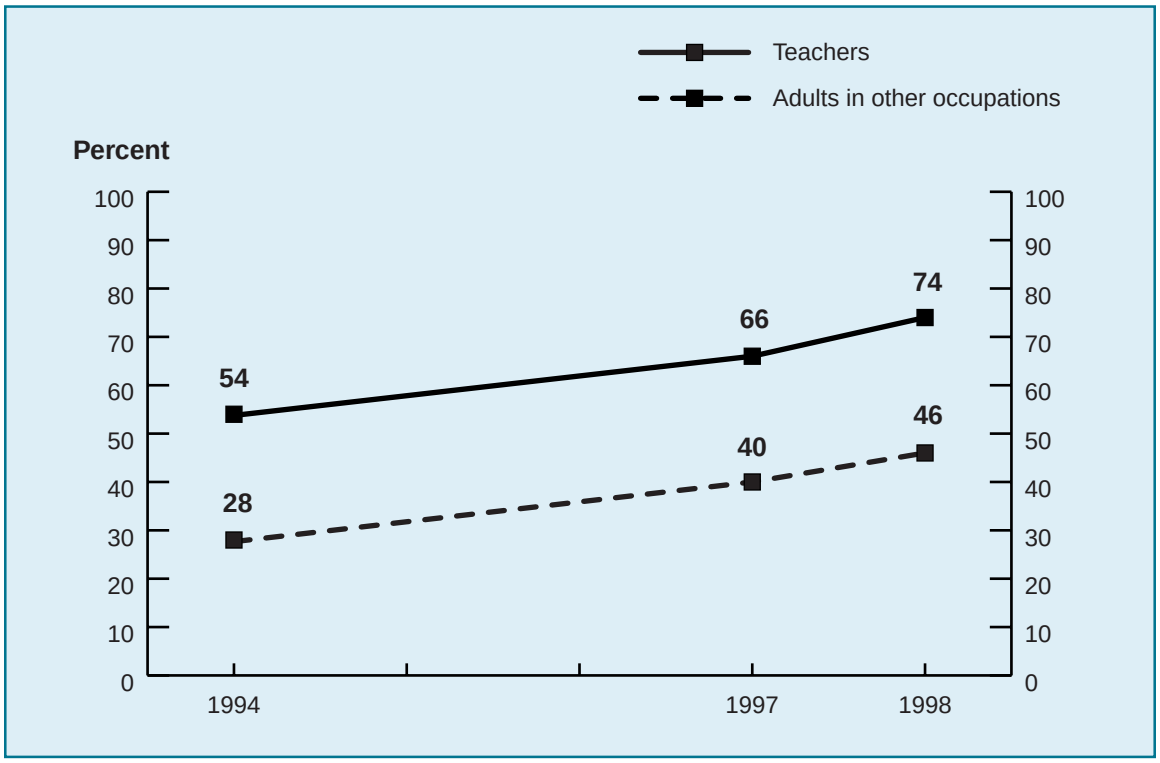
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Advanced Telecommunications in Public Schools, K-12," FRSS 51, NCES 95-731; "Advanced Telecommunications in U.S. Public Elementary and Secondary Schools, 1995," FRSS 57, NCES 96-854; "Advanced Telecommunications in U.S. Elementary and Secondary Public Schools, Fall 1996," FRSS 61, NCES 97-944; "Internet Access in Public Schools," FRSS 64, NCES 98-031; "Internet Access in Public Schools and Classrooms, 1994-1998," FRSS 69, NCES 1999-017; and "Internet Access in U.S. Public Schools and Classrooms: 1994-99," FRSS 75, NCES 2000-086.

computer in the home in 1998 reported having one computer (71 percent of teachers with computers and 75 percent of adults in other occupations); fewer had two computers (20 percent of teachers and 18 percent of adults in other occupations). Additionally, in 1998, most teachers and adults in other occupations reported having computers that were three years old or newer (71 percent of teachers and 75 percent of adults in other occupations with computers—table A-3.9).

Students' Computer Availability at Home

The CPS also collected data on public and private school students' computer availability at home in 1994 to 1998. According to these data, the percent of students who had at least one computer in the home increased from 36 percent in 1994 to 56 percent in 1998 (table A-3.9).

FIGURE 3.7.—PERCENT OF ELEMENTARY AND SECONDARY TEACHERS AND ADULTS IN OTHER OCCUPATIONS WHO REPORT HAVING COMPUTERS AT HOME: 1994, 1997, AND 1998



NOTE: Adults in other occupations includes all survey respondents who reported an occupation which was not elementary or secondary teacher.

SOURCE: U.S. Census Bureau, Current Population Survey, November 1994, October 1997, December 1998.

Availability of Technology to Teachers and Students in 1999

The remaining sections of this chapter describe teachers' reports of the availability of computers in public school teachers' schools and classrooms followed by the availability of the Internet in these locations, and the availability of both computers and the Internet at home. Finally, the relationship between computer availability in the classroom and teachers' computer-related activities is explored.

Computer Availability in the School

Nearly all public school teachers (99 percent) reported having computers available somewhere in their schools in 1999 (table A-3.9). Eighty-four percent of public school teachers had computers available in their classrooms (table 3.1), and 95 percent of teachers had computers available elsewhere in the school.[1]

Number of computers in the classroom. In addition to asking teachers if they had computers available in the classrooms, the 1999 FRSS survey also asked for the *number* of computers

[1] These two categories were not mutually exclusive.

TABLE 3.1.—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	**84**	**16**	**95**	**5**
Instructional level				
Elementary	89	11	93	7
Secondary	75	25	99	1
Enrollment size				
Less than 300	87	13	89	11
300 to 999	88	12	95	5
1,000 or more	71	29	97	3
Locale				
City	80	20	94	6
Urban fringe	83	17	95	5
Town	92	8	93	7
Rural	87	13	97	3
Percent minority enrollment in school				
Less than 6 percent	85	15	94	6
6 to 20 percent	86	14	95	5
21 to 49 percent	89	11	96	4
50 percent or more	77	23	95	5

NOTE: Detail may not sum to 100 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.

available in the classroom. As previously indicated, most public school teachers (84 percent) reported having at least one computer in their classrooms in 1999 (table 3.1). Thirty-six percent had one computer in their classrooms, 38 percent reported having two to five computers in their classrooms, and 10 percent reported having more than five computers in their classrooms (table 3.2).

Differences in school and classroom computer availability by school characteristics. Teachers' computer availability in 1999 varied by several school characteristics, including instructional level, enrollment size, location, minority enrollments, and poverty concentration. Elementary teachers were more likely to have computers in their classrooms (89 percent) than secondary teachers (75 percent—table 3.1). Teachers in schools enrolling less than 300 and 300 to 999 students were more likely to have computers in their classrooms (87 and 88 percent, respectively) than teachers in schools with the largest enrollments (71 percent). Furthermore, teachers in schools

located in towns were more likely to have computers located in their classrooms than teachers in schools located in cities and in urban fringes (92 percent compared with 80 percent and 83 percent, respectively). Last, teachers in schools with 21 to 49 percent minority enrollments were more likely to have computers in the classroom than teachers in schools with 50 percent or more minority enrollments (89 percent of teachers compared with 77 percent of teachers).

There were also differences among teachers who had varying *numbers* of computers in the classroom (table 3.2). Not only were some groups of teachers less likely to have computers in their classrooms (e.g., teachers in secondary schools or large schools), but they were also more likely than other teachers to have only one computer in their classrooms. Teachers in secondary schools were more likely to have one computer than elementary teachers (45 percent compared with 33 percent), and less likely to have two to five computers than elementary teachers (20 percent compared with 46 percent).

Computer availability also varied by school size. For example, teachers in schools enrolling 1,000 or more students were more likely to report having one computer in their classrooms than teachers in schools with less than 300 students (41 percent compared with 28 percent). Teachers in schools enrolling 1,000 or more students were less likely, however, to report having two to five computers than either schools enrolling 300 to 999 students or schools enrolling less than 300 students (20 percent compared with 43 percent and 46 percent, respectively).

Internet Availability at School

Sixty-four percent of public school teachers who reported having computers in their classrooms also reported having Internet availability in their classrooms in 1999. Ninety percent of teachers who reported having computers available elsewhere in their schools also reported that the Internet was available elsewhere in the school (table 3.3).[2]

Number of classroom computers connected to the Internet. Among the teachers who reported having computers available in their classrooms, approximately one-third had no computers connected to the Internet and about half had one computer connected to the Internet (figure 3.8). It was less commonly reported that teachers had two to five computers connected or more than five computers connected to the Internet (13 percent and 4 percent, respectively).

Differences in school and classroom Internet availability by school characteristics. There were differences in overall Internet availability (in class or elsewhere in the school) and in the number of classroom computers connected to the Internet by several school characteristics. For example, secondary teachers with computers in their classrooms were more likely to have Internet availability in their classrooms (72 percent) than elementary teachers (60 percent—table 3.3). As indicated previously, elementary teachers were more likely to have computers in their classrooms than secondary teachers; this indicates that although elementary teachers were more likely to have computers in their classrooms, secondary teachers were more likely to have the

[2] These two categories were not mutually exclusive.

TABLE 3.2.—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	**16**	**36**	**38**	**10**
Instructional level				
Elementary	11	33	46	10
Secondary	25	45	20	10
Enrollment size				
Less than 300	13	28	46	12
300 to 999	12	36	43	9
1,000 or more	29	41	20	10
Locale				
City	20	34	37	9
Urban fringe	17	35	38	10
Town	8	43	38	11
Rural	13	37	38	11
Percent minority enrollment in school				
Less than 6 percent	16	34	40	10
6 to 20 percent	13	40	38	9
21 to 49 percent	11	39	40	10
50 percent or more	23	33	35	10
Percent of students in school eligible for free or reduced-price school lunch				
Less than 11 percent	13	42	35	9
11 to 30 percent	16	36	38	10
31 to 49 percent	16	37	38	9
50 to 70 percent	13	38	38	11
71 percent or more	18	32	40	11

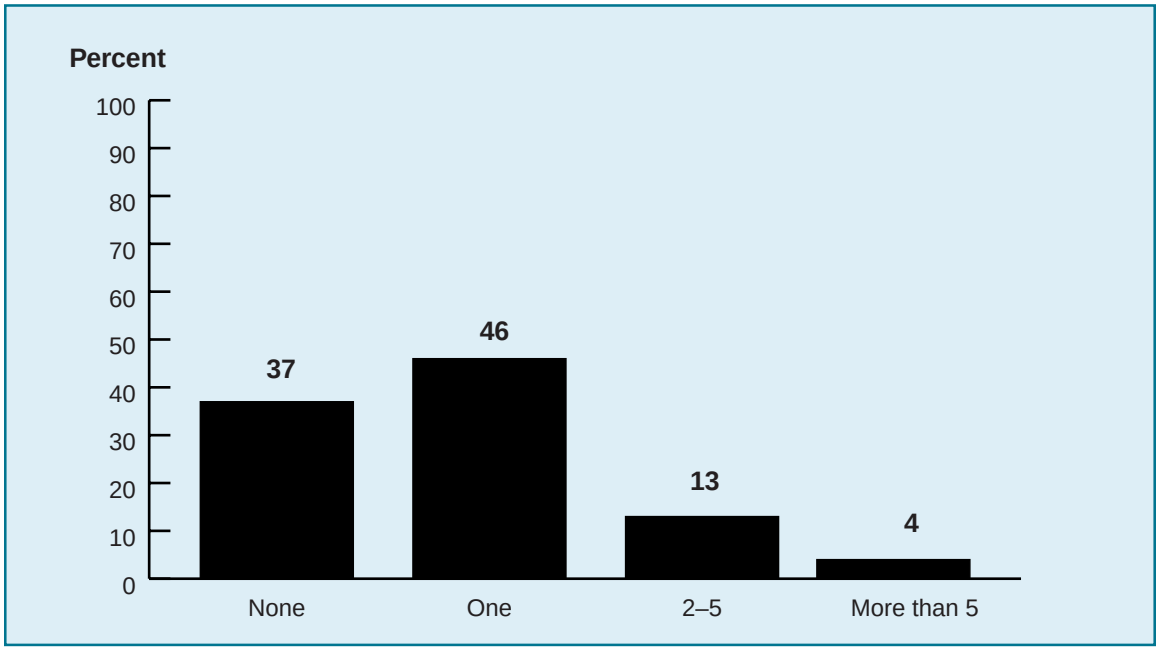
NOTE: Detail may not sum to 100 due to rounding.

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.

Internet available on the computers that they did have in their classrooms. Furthermore, among teachers who reported having computers available elsewhere in the school, secondary teachers were also more likely to have Internet availability elsewhere in the school than were elementary teachers (96 percent compared with 87 percent).

Additionally, teachers in schools located in towns were more likely to have Internet availability elsewhere in the school (96 percent) than teachers in urban fringe schools or city schools (87 percent and 90 percent, respectively). Moreover, teachers in schools with less than 6 percent or 6 to 20 percent minority enrollments were more likely to have the Internet available in the

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



NOTE: Teachers who reported that computers were not available to them in the classroom were excluded from the analysis 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.

classroom than teachers in schools with 50 percent or more minority enrollments (69 percent and 71 percent compared with 51 percent). Similarly, teachers in schools with lower minority enrollments were generally more likely to report this availability elsewhere in the school than teachers in schools with the highest minority enrollments (93 percent of teachers in schools with 6 to 20 percent minority enrollments and 92 percent of teachers in schools with 21 to 49 percent minority enrollments, compared with 83 percent of teachers in schools with 50 percent or more minority enrollments).

Internet availability also varied by poverty concentration. For example, public school teachers in schools where 11 to 30 percent and 31 to 49 percent of the students qualify for free or reduced-price lunch were more likely to have the Internet available in the classroom than teachers in schools with 71 percent or more students eligible (71 percent each compared with 51 percent). Teachers in lower poverty schools were also generally more likely than teachers in the highest poverty schools to have Internet available elsewhere in the school. Specifically, teachers in schools with less than 11 percent, 11 to 30 percent, and 31 to 49 percent students eligible for free or reduced-price lunch were more likely to have this availability than teachers in schools with 71 percent or more students eligible (92 to 93 percent, compared with 80 percent of teachers).

As with overall Internet availability in the classroom, the number of classroom computers that public school teachers reported as having Internet connections varied by instructional level and

minority enrollments, but not percent of students eligible for free or reduced-price lunch (table 3.4). For example, secondary teachers were more likely than elementary teachers to have either one computer connected to the Internet (55 percent compared with 43 percent) or more than five computers connected (6 percent compared with 3 percent).

In addition, teachers in schools with 6 to 20 percent minority enrollments were more likely than teachers in schools with 50 percent or more minority enrollments to have one computer

TABLE 3.3.—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	**64**	**36**	**90**	**10**
Instructional level				
Elementary	60	40	87	13
Secondary	72	28	96	4
Enrollment size				
Less than 300	67	33	93	7
300 to 999	62	38	89	11
1,000 or more	67	33	91	9
Locale				
City	60	40	90	10
Urban fringe	64	36	87	13
Town	67	33	96	4
Rural	65	35	92	8
Percent minority enrollment in school				
Less than 6 percent	69	31	92	8
6 to 20 percent	71	29	93	7
21 to 49 percent	62	38	92	8
50 percent or more	51	49	83	17
Percent of students in school eligible for free or reduced-price school lunch				
Less than 11 percent	67	34	92	8
11 to 30 percent	71	29	93	7
31 to 49 percent	71	29	93	7
50 to 70 percent	55	45	87	13
71 percent or more	51	49	80	20

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. Detail may not sum to 100 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.

connected to the Internet (55 percent compared with 39 percent). Moreover, teachers in schools with less than 6 percent minority enrollments were more likely to report having two to five computers connected than teachers in schools with 50 percent or more minority enrollments (19 percent compared with 9 percent).

E-mail Availability in School

Public school teachers were asked whether e-mail was available in their schools in 1999. Among those who reported having any computers available in their schools, 74 percent indicated that e-mail was also available (table 3.5). E-mail availability varied by location of school, minority enrollments, and poverty concentration. Rural teachers were more likely to report e-mail availability (81 percent) than city teachers (70 percent). Moreover, teachers in schools with lower minority enrollments were more likely to report that e-mail was available than teachers in schools with the highest minority enrollments (78 percent of teachers in schools with less than 6 percent minority enrollments, 80 percent in schools with 6 to 20 percent minority enrollments, and 74 percent in schools with 21 to 49 percent minority enrollments, compared with 62 percent of teachers in schools with 50 percent or more minority enrollments). Furthermore, teachers in schools with less than 11 percent, 11 to 30 percent, and 31 to 49 percent students eligible for free or reduced-price lunch were more likely to have e-mail available than teachers in schools with more than 70 percent eligible students (76 percent, 78 percent, and 80 percent of teachers, compared with 61 percent).

Availaility at Home: Computers, Internet, and School Network

Teachers' Computer, Internet, and School Network Availability at Home

As reported earlier, results of the 1998 CPS indicate that 74 percent of elementary and secondary public and private school teachers had a computer at home. According to the 1999 FRSS survey of teachers' technology use, 82 percent of public school teachers reported having a computer at home (table 3.6). The 1999 FRSS teacher survey also asked teachers if they had the Internet available at home, and if their school had a network that they could access at home. Sixty-three percent of public school teachers reported having the Internet available at home in 1999. In addition, 27 percent reported that their school had a network that they could use to access the Internet from home.

There were several differences in teachers' availability of computers and the Internet at home by school characteristics in 1999. For example, teachers in schools with 1,000 students or more enrolled were more likely to have a computer at home than teachers in schools with less than 300 students enrolled (86 percent compared with 74 percent). Similarly, teachers in schools with 300 to 999 students enrolled and schools with 1,000 or more students enrolled were more likely to have Internet at home than teachers in schools with less than 300 students enrolled (64 percent and 65 percent, compared with 52 percent). Teachers in urban fringe schools and schools located in towns were more likely to have the Internet available at home

TABLE 3.4.—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	**37**	**46**	**13**	**4**
Instructional level				
Elementary	40	43	14	3
Secondary	29	55	11	6
Enrollment size				
Less than 300	33	48	14	4
300 to 999	38	44	14	4
1,000 or more	36	52	9	3
Locale				
City	41	41	15	3
Urban fringe	37	49	11	3
Town	32	50	14	4
Rural	35	46	14	5
Percent minority enrollment in school				
Less than 6 percent	31	46	19	3
6 to 20 percent	30	55	11	4
21 to 49 percent	39	45	13	4
50 percent or more	49	39	9	2
Percent of students in school eligible for free or reduced-price school lunch				
Less than 11 percent	34	47	14	5
11 to 30 percent	30	51	16	3
31 to 49 percent	29	51	15	5
50 to 70 percent	47	39	11	4
71 percent or more	49	39	9	3

NOTE: Teachers who reported that computers were not available to them in the classroom were excluded from the analyses presented in this table. Detail may not sum to 100 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.

than rural school teachers (67 percent and 66 percent, compared with 53 percent). Furthermore, less than a third of all teachers reported having a school network that could be accessed from home, and teachers in the largest schools and the lowest poverty schools reported the highest network availability, compared with teachers in the smallest schools and the highest poverty schools.

TABLE 3.5.—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	**74**	**26**
Locale		
City	70	30
Urban fringe	71	29
Town	79	21
Rural	81	19
Percent minority enrollment in school		
Less than 6 percent	78	22
6 to 20 percent	80	20
21 to 49 percent	74	26
50 percent or more	62	38
Percent of students in school eligible for free or reduced-price school lunch		
Less than 11 percent	76	24
11 to 30 percent	78	22
31 to 49 percent	80	20
50 to 70 percent	69	31
71 percent or more	61	39

NOTE: Teachers who reported that computers were not available to them anywhere in the school were excluded from the analyses presented in this table. Detail may not sum to 100 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.

Students' Computer Availability at Home

Because 48 percent of the teachers surveyed in 1999 reported assigning projects using the computer outside of class, it is useful to know if students had the resources to complete these assignments at home. This section uses data from the 1999 FRSS teacher survey[3] to describe the availability of computers in students' homes during that year. Results of this survey indicate that 36 percent of the teachers reported that more than half of their students had computers at home (table 3.7). This means that 64 percent of teachers did *not* believe that the majority of their students had a computer available at home. The percent of teachers who reported that more than half of their students had computers at home varied by several school characteristics. For example, teachers in urban fringe schools were more likely to report that the majority of

[3] The FRSS data reported in this section are teachers' estimates of students' home computer availability, and therefore may not accurately reflect whether students had computers at home. Data from the 1998 CPS on the percent of students who reported having a computer at home were presented earlier in the chapter.

TABLE 3.6.—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	**82**	**18**	**63**	**37**	**27**	**73**
Enrollment size						
Less than 300	74	26	52	48	18	82
300 to 999	83	17	64	36	27	73
1,000 or more	86	14	65	35	29	71
Locale						
City	79	21	62	38	26	74
Urban fringe	86	14	67	33	29	71
Town	84	16	66	34	28	72
Rural	79	21	53	47	21	79
Percent of students in school eligible for free or reduced-price school lunch						
Less than 11 percent	85	15	70	30	36	64
11 to 30 percent	86	14	67	33	25	75
31 to 49 percent	83	17	57	43	28	72
50 to 70 percent	79	21	59	42	25	75
71 percent or more	79	21	59	41	20	80

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. Detail may not sum to 100 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.

their students had computers at home than teachers in any other location (48 percent compared with 26 percent to 30 percent).

Teachers in schools with the highest minority enrollments (50 percent or more) were *less* likely to report that the majority of their students had computers at home than teachers in any other schools (9 percent as compared with 39 percent to 50 percent). In addition, teachers in the lower poverty schools (less than 71 percent of students eligible for free or reduced-price lunch) were more likely to report that their students had computers at home than teachers in the highest poverty schools (71 percent or more eligible students).

TABLE 3.7.—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	**36**
Enrollment size	
Locale	
City	26
Urban fringe	48
Town	29
Rural	30
Percent minority enrollment in school	
Less than 6 percent	44
6 to 20 percent	50
21 to 49 percent	39
50 percent or more	9
Percent of students in school eligible for free or reduced-price school lunch	
Less than 11 percent	72
11 to 30 percent	46
31 to 49 percent	34
50 to 70 percent	21
71 percent or more	2

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.

Teachers' Use of Technology and Computer Availability in their Classrooms

The push to increase the availability of technology in the classroom is based on the assumption that availability will increase students' and teachers' use of this technology, and that this use will lead to positive outcomes for students (U.S. Department of Education, 1996).[4] This section explores the relationship between the numbers of computers available in the classroom in 1999, and teachers' use of those computers for instructional purposes.

[4] The positive outcomes cited include increased job opportunity, learning experiences, and academic achievement (U.S. Department of Education, 1996). It should be noted, however, that disagreement exists in the research literature on the benefits of technology as it relates to academic achievement. Some studies report a positive relationship between the use of education technology and student achievement (e.g., Mann, Shakeshaft, Becker and Kottkamp, 1999; Wenglinsky, 1998), while others report marginal to no effect (e.g., Becker, 1990a; Clark, 1994).

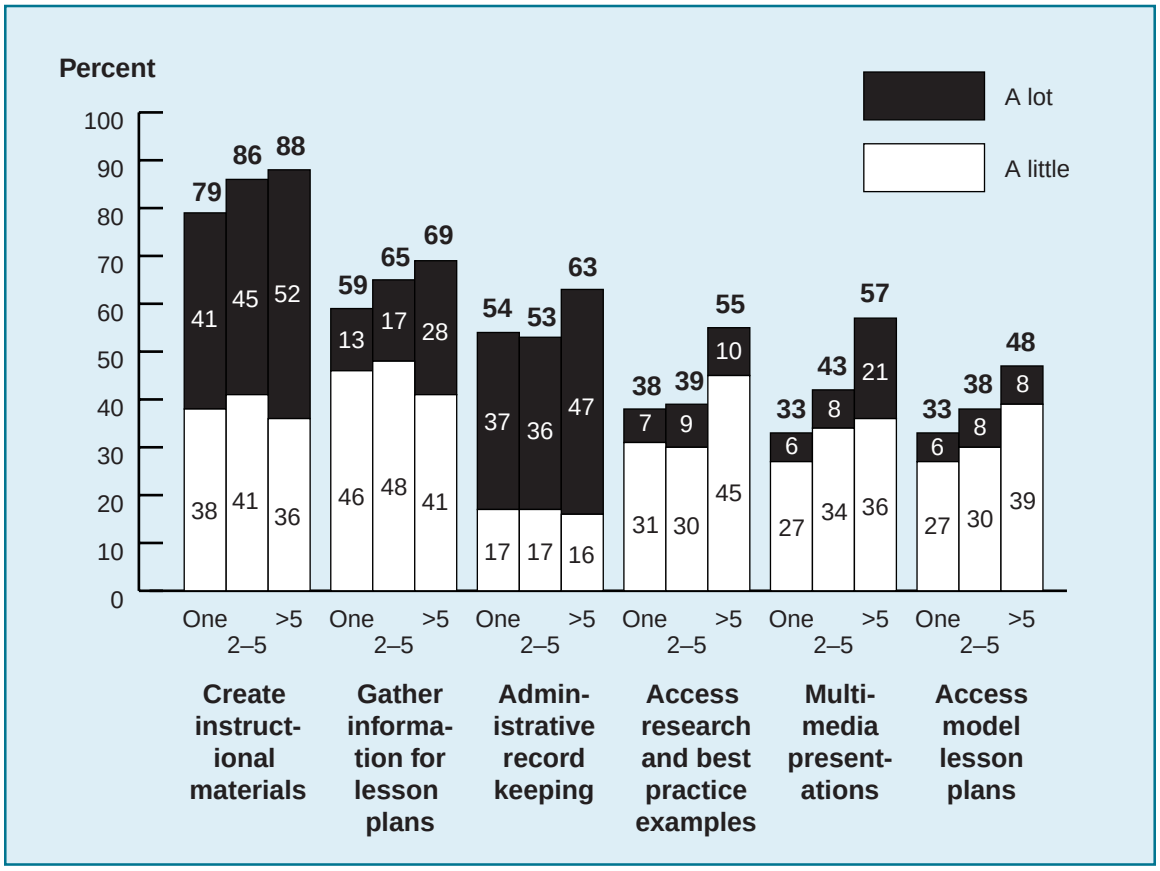
Preparatory Tasks and Computer Availability

Among teachers who reported having computers located in their classrooms, those who had more than 5 classroom computers were more likely than those with fewer classroom computers to report doing various preparatory activities "a lot" (figure 3.9). For example, 28 percent of teachers with more than five computers reporting using computers or the Internet a lot to gather information for lesson plans, compared with 17 percent of teachers with two to five computers and 13 percent of teachers with one computer. A similar relationship was found for using computers or the Internet a lot to prepare multimedia presentations.

Classroom Instruction and Computer Availability

Teachers' reports of assigning students to use computers or the Internet for various instructional purposes differed by the number of computers in their classrooms. For example, 59 percent of teachers with one computer in the classroom reported *not* assigning students to use computers or the Internet to solve problems or analyze data, compared with 40 percent of teachers with two to five computers and 23 percent of teachers with more than five computers (table 3.8). Conversely, teachers with more than five computers in their classrooms were most likely to report assigning problem solving or data analysis computer work to a "large extent," followed by teachers with two to five computers and teachers with one computer (21 percent compared with 9 percent and 5 percent, respectively). Similar relationships were found for word processing and practicing drills.

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



NOTE: Teachers who reported that computers were not available to them in the classroom 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.

TABLE 3.8.—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	**43**	**45**	**12**
Solve problems/analyze data			
Not at all	59	40	23
Small extent	20	26	29
Moderate extent	16	26	27
Large extent	5	9	21
Word processing/spreadsheets			
Not at all	45	33	14
Small extent	19	20	21
Moderate extent	21	24	23
Large extent	15	23	42
Drills/practice			
Not at all	61	37	21
Small extent	21	20	23
Moderate extent	14	26	26
Large extent	4	18	30

NOTE: Teachers who reported that computers were not available them in the classroom were excluded from the analyses presented in this table. Percents are computed down the column for each grouping, but may not sum to 100 because of 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.

Chapter 4

Frequency of Technology Use

Highlights

- In 1999, nearly all teachers used the computers and the Internet when available in their schools, and most reported that their students used computers and the Internet in the school as well. Teachers were generally more likely to use computers and the Internet when located in their classrooms than elsewhere in the school, while their students were more likely to use computers and the Internet outside the classroom than inside.

- Elementary teachers were more likely to report that their students used computers at school, and secondary teachers were more likely to report that their students used the Internet at school.

- Teachers with more computers or more computers connected to the Internet in their classrooms generally used these technologies more often than teachers with fewer computers or Internet connections (as did their students). Additionally, teachers with computer or Internet connections in their classrooms used these technologies *elsewhere* in the school more often than teachers without such equipment in their classrooms (as did their students).

- Teachers in schools with lower minority enrollments were generally more likely to report using e-mail than teachers in schools with the highest minority enrollments, and teachers in schools with lower minority enrollments and lower poverty concentrations were generally more likely than teachers in schools with the highest minority enrollments and the highest poverty concentrations to report that their students used the Internet.

- Teachers with fewer years of teaching experience were generally more likely than teachers with more experience to report using computers, the Internet, and e-mail at school to a large extent.

- In 1999, nearly all teachers with computers or the Internet available at home used these technologies. Teachers with fewer years of teaching experience generally used these technologies at home more frequently than their most experienced colleagues. Teachers who used computers for instruction and who assigned projects that required their students to use a computer were more likely than teachers who did not use these technologies for such purposes to use computers and the Internet at home to a large extent.

CHAPTER 4

Frequency of Technology Use

This chapter provides findings on the frequency with which public school teachers and students use technology at school and at home. The chapter is divided into three main sections. The first uses the Current Population Survey (CPS) data to provide background information regarding technology use in schools and classrooms. The second section uses Fast Response Survey System (FRSS) and CPS data to describe the frequency of teachers' and students' technology use in schools and classrooms. The final section uses FRSS, National Assessment of Educational Progress (NAEP), and CPS data to examine teachers' and students' technology use at home. Each section explores frequency of use by the location and availability of technology in schools and classrooms, as well as school and teacher characteristics.

Frequency of Technology Use in Schools and Classrooms: 1997 to 1998

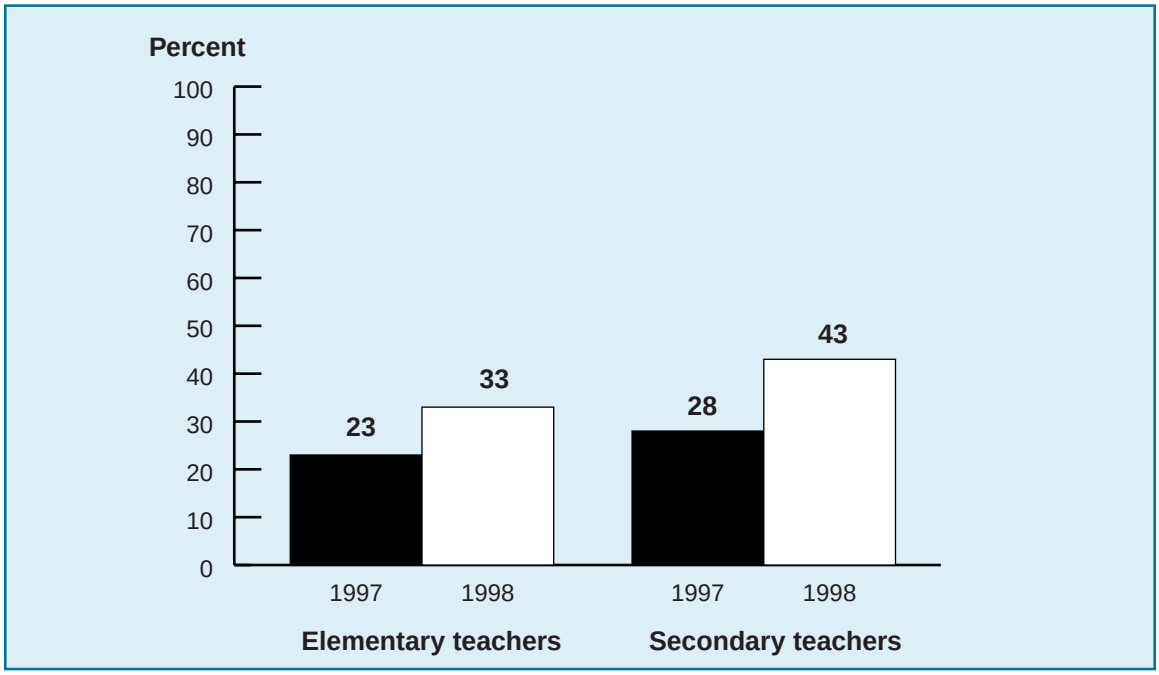
Internet

According to CPS data on Internet use, this technology has been used somewhat infrequently by public and private school teachers in past years, but use of this technology is growing. For example, in public and private schools, the percent of elementary teachers who used the Internet at work rose from 23 to 33 percent between 1997 and 1998, and the percent of secondary teachers who used the Internet at work increased from 28 to 43 percent (figure 4.1).

Current Frequency of Technology Use in Schools and Classrooms

This section presents recent data on teacher and student use of computers, including e-mail, Internet, and other technologies, from the

FIGURE 4.1.—PERCENT OF ELEMENTARY AND SECONDARY TEACHERS REPORTING USE OF THE INTERNET AT WORK: 1997 AND 1998



SOURCE: U.S. Census Bureau, Current Population Survey (CPS): October 1997 and December 1998.

1999 FRSS teacher survey of public school teachers' use of technology.

Frequency of Teachers' Technology Use at School

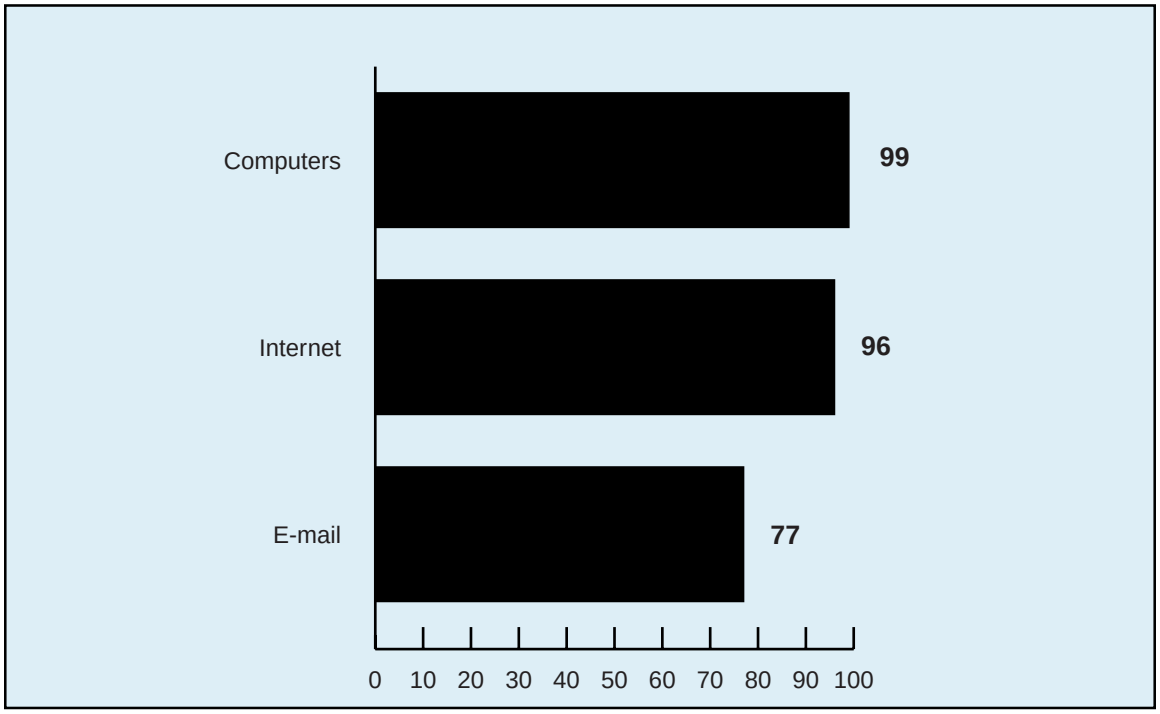
In the 1999 FRSS teacher survey, public school teachers were asked if computers, the Internet, and e-mail were available to them in various locations, and if available, the extent to which they used them ("not at all," "small extent," "moderate extent," or "large extent"). This section describes the frequency of teachers' use of these technologies by selected teacher and school characteristics and by the availability and location of technology in schools and classrooms.

Overall technology use. Among teachers who reported that computers were available in their schools, 99 percent indicated that they used computers either in their classrooms or elsewhere in the school (figure 4.2). Additionally, among teachers who indicated that computers with Internet connections were available in their schools, 96 percent used the Internet from their classrooms or elsewhere in their schools. Furthermore, at least three-fourths of teachers with e-mail availability used it at school.

Frequency of use by location of technology. The 1999 FRSS teacher survey asked teachers how frequently they used computers and the Internet in two locations: the classroom and elsewhere in the school (i.e., computer labs, libraries, or media centers).[1] Of the teachers who reported having computer availability in their classrooms (84 percent), nearly all of them (98 percent)

[1] These two categories were not mutually exclusive.

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



NOTE: Teachers who reported that computers, the Internet, and e-mail were not available to them anywhere in the school were excluded respectively from the "Computers," "Internet," and "E-mail" analyses presented in this figure. Detail may not sum to totals due to rounding.

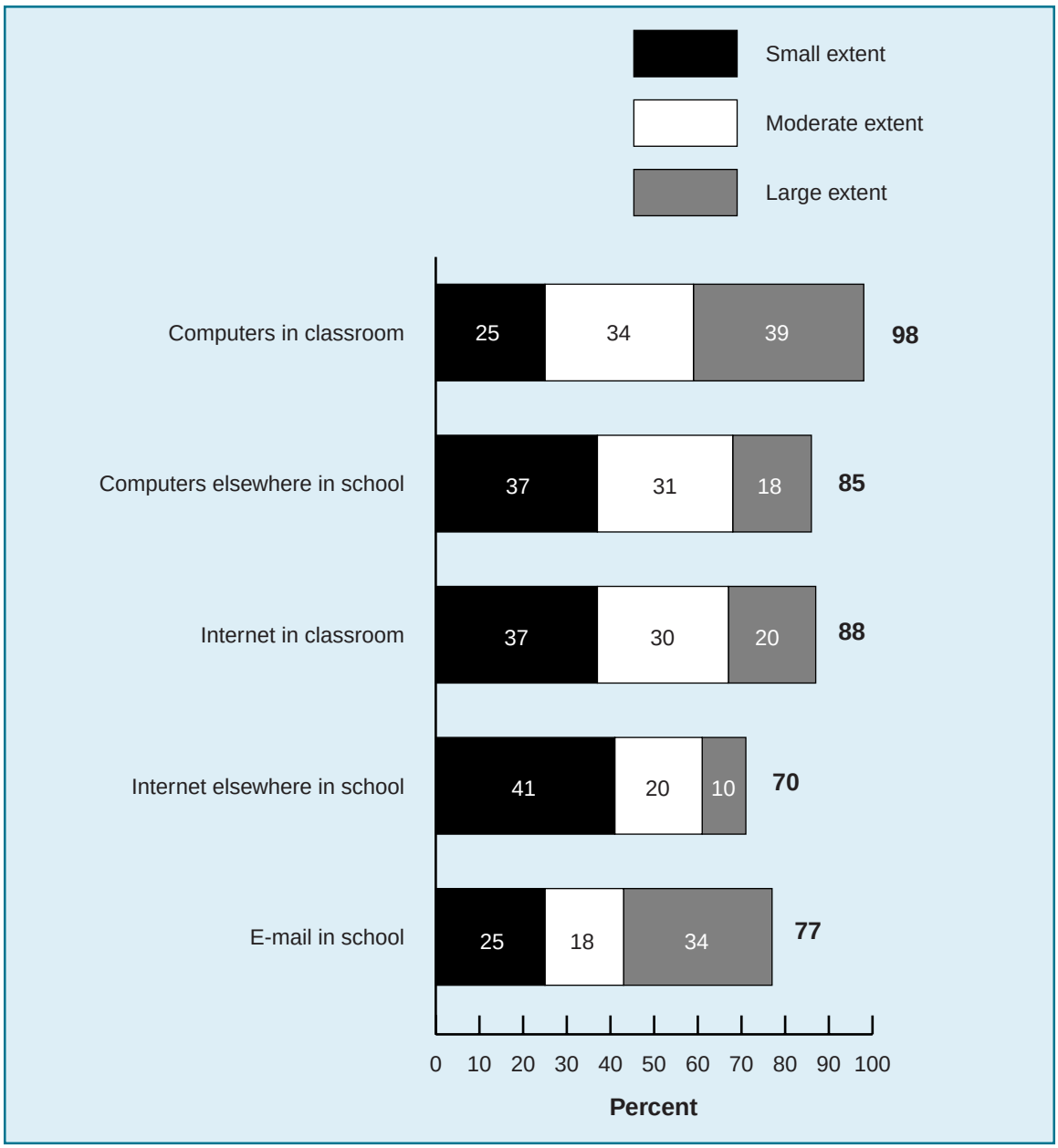
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

reported using them at least to some extent (figure 4.3). Of the teachers who reported having computers available elsewhere in the school (95 percent), 85 percent reported using them. Teachers were significantly more likely to use computers in the classroom than elsewhere in the school, and they were also more likely to use them to a large extent in the classroom than elsewhere in the school (39 percent compared with 18 percent).

In addition, among teachers with Internet availability in their classrooms (64 percent), 88 percent reported using this technology. Of those teachers who reported Internet availability elsewhere in the school (90 percent), 70 percent indicated using it. Teachers were more likely to use the Internet in the classroom than elsewhere in the school, and they were also more likely to use it to a large extent in their classrooms than elsewhere in the school (20 percent compared with 10 percent). Furthermore, of the 74 percent of teachers reporting e-mail availability in the school, 77 percent used it at least to some extent.

Frequency of use by number of computers available. The 1999 FRSS teacher survey also asked teachers the number of computers and computers with Internet connections that were located in their classrooms. Overall, teachers with more computers in their classrooms used them more frequently than teachers with fewer computers in their classrooms. For example, 62 percent of public school teachers with more than five computers in their classrooms used them

FIGURE 4.3.—PERCENT OF PUBLIC SCHOOL TEACHERS REPORTING FREQUENCY OF USE OF VARIOUS TECHNOLOGIES TO A SMALL, MODERATE, OR LARGE EXTENT: 1999

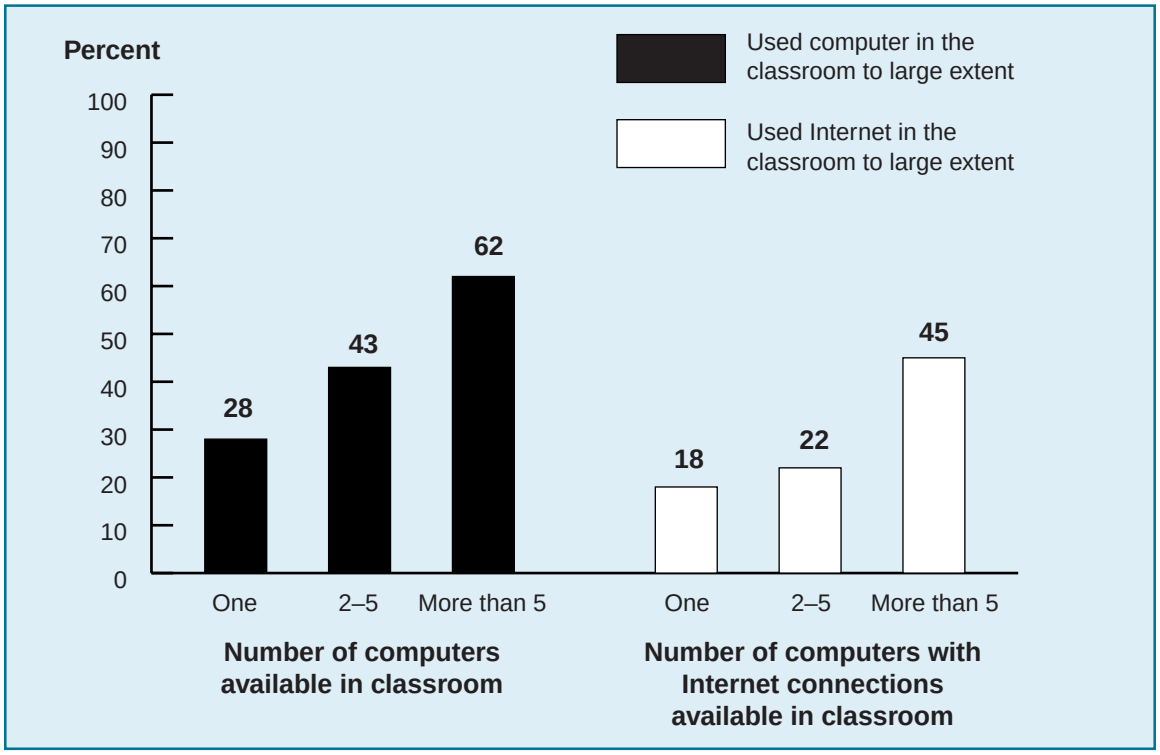


NOTE: Teachers reporting not having the listed technologies available were excluded from their respective analyses presented in this figure. The listed technologies were available to the following percentages of public school teachers: Computers in classroom, 84 percent; Computers elsewhere in school, 95 percent; Internet in classroom, 64 percent; Internet elsewhere in school, 90 percent; E-mail in school, 74 percent. 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.

to a large extent compared with 43 percent of teachers with two to five computers and 28 percent of teachers with one computer in their classrooms (figure 4.4). Similarly, teachers with more than five computers with Internet access in their classrooms used the Internet from the classroom more frequently than teachers with fewer computers with Internet access in their

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



NOTE: Teachers who reported that computers were not available to them in the classroom were excluded from the "Number of computers available in the classroom" analyses presented in this figure. Teachers who reported that computers with Internet connections were not available to them in the classroom were excluded from the "Number of computers with Internet connections available in the classroom" analyses presented in this figure.

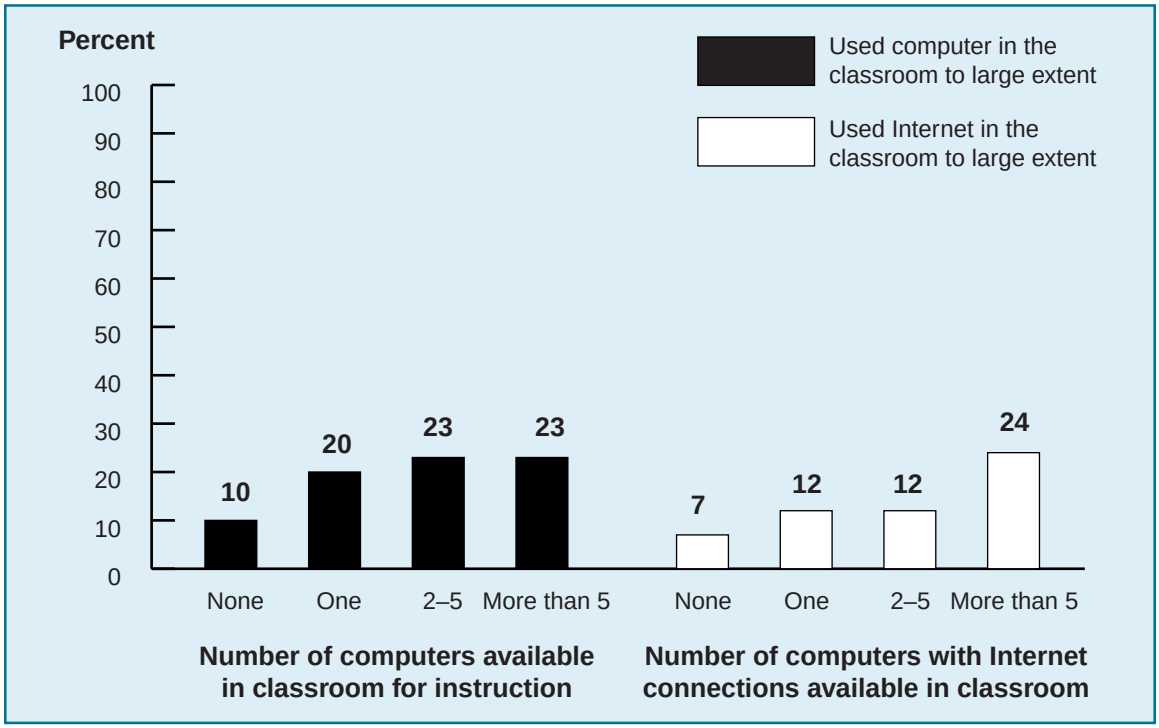
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

classrooms. For example, 45 percent of teachers with more than five computers connected to the Internet used the Internet from the classroom to a large extent in their classrooms compared with 18 percent of teachers with one computer.

Furthermore, teachers with computers in their classrooms used computers *elsewhere in the school* more often than teachers with no classroom computers (figure 4.5). At least one-fifth of teachers with computers in their classrooms used computers elsewhere in the school to a large extent compared with 10 percent of teachers with no computers in their classrooms. Similarly, teachers with one or more than five computers connected to the Internet in their classrooms used the Internet *elsewhere* in the school more often than teachers without classroom computers with Internet connections. Twenty-four percent of teachers with more than five classroom computers connected to the Internet and 12 percent of teachers with one classroom computer connected to the Internet used the Internet elsewhere in the school to a large extent, compared with 7 percent of teachers with no classroom computers connected to the Internet.

Frequency of use by teacher and school characteristics. Differences were found in the frequency of teachers' use of computers, the Internet, and e-mail by school and teacher characteristics. Teachers

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



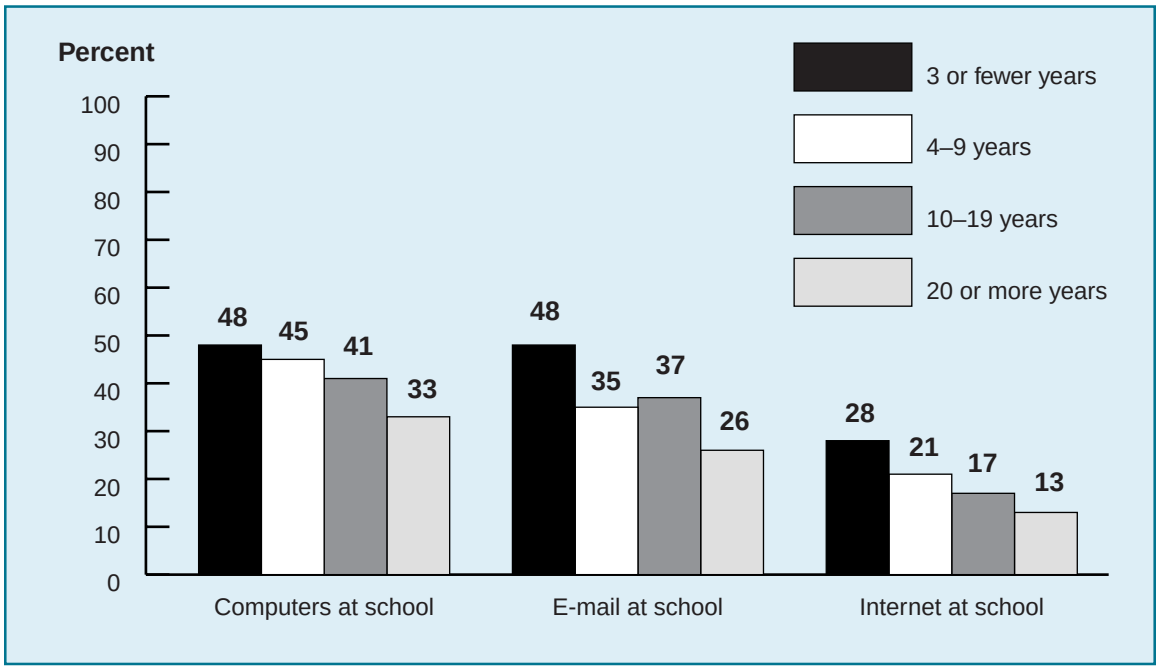
NOTE: Teachers who reported that computers were not available to them in the classroom were excluded from the "Number of computers available in the classroom" analyses presented in this figure. Teachers who reported that computers with Internet connections were not available to them in the classroom were excluded from the "Number of computers with Internet connections available in the classroom" 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.

with fewer years of teaching experience were more likely to use computers, the Internet, and e-mail to a large extent at school than their more experienced colleagues. For example, 48 percent of teachers with 3 or fewer years of teaching experience and 45 percent of teachers with 4 to 9 years of experience used computers at school to a large extent, compared with 33 percent of teachers with 20 or more years experience (figure 4.6). The pattern is similar for Internet and e-mail use. Furthermore, teachers in schools with minority enrollments of 6 to 20 percent were more likely to use e-mail to a large extent than teachers in schools with the highest minority enrollments (42 percent compared with 25 percent—table 4.1).

Comparisons with other occupations. According to the 1997 CPS, 69 percent of adults employed as secondary teachers (either in public or private schools) and 67 percent employed as elementary teachers (either in public or private schools) reported using computers at work (figure 4.7). Both are significantly lower than such occupations as librarians, editors and reporters, and college faculty, and the percentage of elementary school teachers who reported using computers at work was lower than that of those employed as lawyers and judges and real estate and

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



NOTE: Teachers who reported that computers were not available to them anywhere in the school were excluded from the "Computers at school" analyses presented in this figure. Teachers who reported that e-mail was not available to them anywhere in the school were excluded from the "E-mail at school" analyses presented in this figure. Teachers who reported that the Internet was not available to them anywhere in the school were excluded from the "Internet at school" 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.

sales agents. However, the percentage for both elementary and secondary school teachers was higher than that of teachers' aides (40 percent). Forty-eight percent of U.S. adults employed in other occupations reported using computers at work.

Frequency of Students' Technology Use at School

In the 1999 FRSS teacher survey, public school teachers were asked how often students in one of their typical classes used computers and the Internet—"not at all," "rarely," "sometimes," or "often"—in various locations (i.e., in classrooms and elsewhere in the school). This section describes the frequency of students' use of computers and the Internet by the availability and location of technology in schools and classrooms and by selected teacher and school characteristics. Findings presented in this section are restricted to teachers who reported that these technologies were available in their schools.

---

[2] Estimates of the frequency of teachers' use of technology (figure 4.3) and students' use of technology (figure 4.8) are not comparable. Due to differences in the way the questions were asked for teachers' own use and their students' use, the sample filter representing availability is somewhat different for each group.

TABLE 4.1.—PERCENT OF PUBLIC SCHOOL TEACHERS REPORTING USING E-MAIL AT SCHOOL TO A LARGE EXTENT, BY SCHOOL CHARACTERISTICS: 1999

School characteristics	E-mail used
All public school teachers	**34**
Locale	
City	31
Urban fringe	36
Town	35
Rural	32
Percent minority enrollment in school	
Less than 6 percent	36
6 to 20 percent	42
21 to 49 percent	30
50 percent or more	25
Percent of students in school eligible for free or reduced-price school lunch	
Less than 11 percent	37
11 to 30 percent	41
31 to 49 percent	33
50 to 70 percent	26
71 percent or more	29

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.

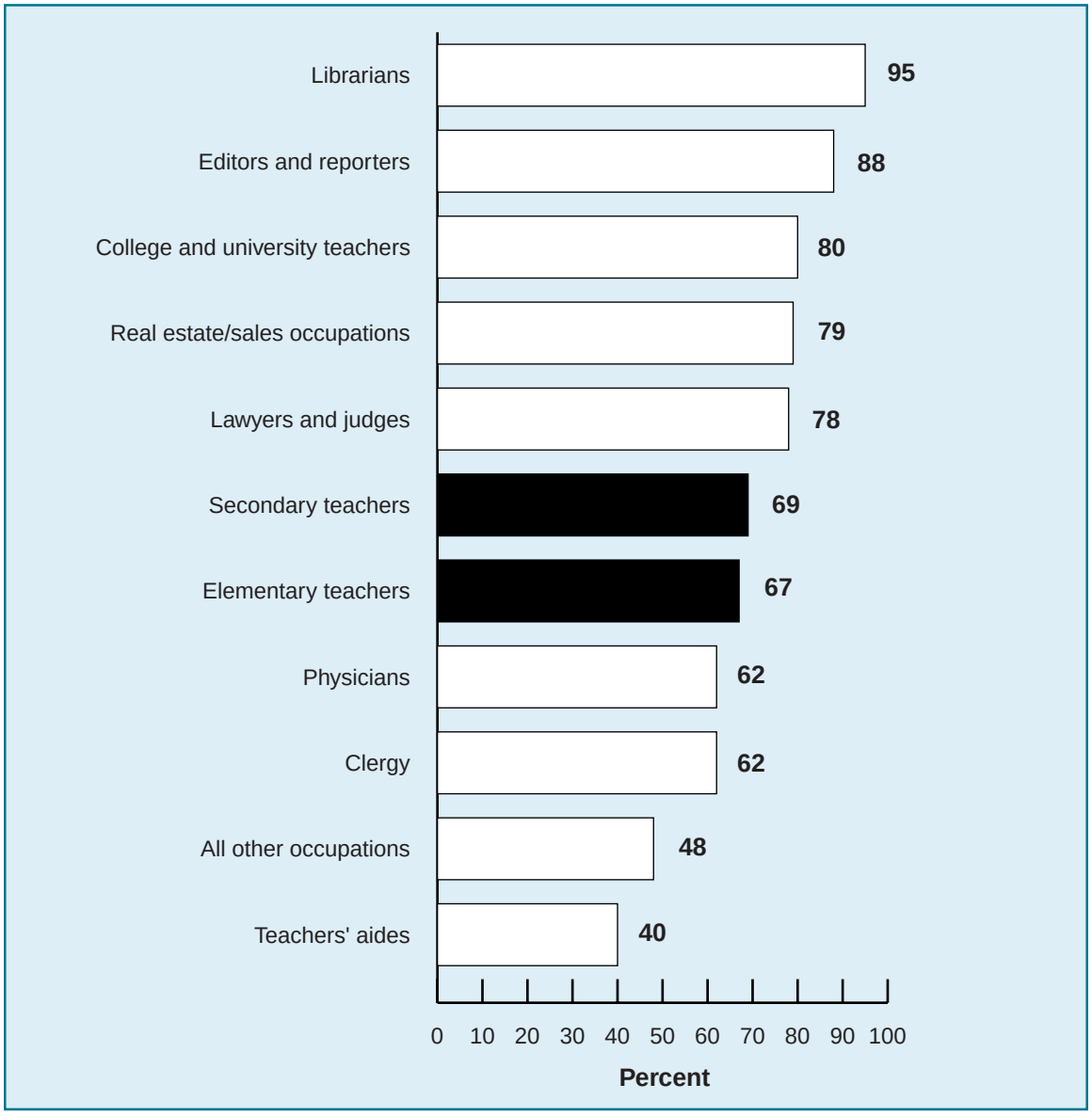
Overall technology use. Eighty-eight percent of teachers with computers available in their schools reported that their students used computers either in the classroom or in computer labs, libraries, and media centers in 1999 (table A-4.3). Furthermore, 61 percent of all teachers reported that students used the Internet in the classroom or somewhere else in the school in 1999 (table A-4.3).

Frequency of use by location of technology. Approximately seven out of ten teachers reported that students used classroom computers; however, a higher percentage of teachers (78 percent) reported that students used them elsewhere in the school (figure 4.8).[2] Thirty-four percent of teachers reported that students used the Internet in the classroom; however, a higher percentage of teachers (55 percent) reported that students used the Internet elsewhere in the school.

Twenty-six percent of teachers reported that students used classroom computers often, and 28 percent of teachers reported that students used computers elsewhere often. Six percent of teachers indicated that students used classroom computers with Internet access often, and 9

[3] Distance learning is defined as the transmission of information from one geographic location to another via various modes of telecommunications technology.

FIGURE 4.7.—PERCENT OF EMPLOYED ADULTS IN THE UNITED STATES REPORTING USE OF COMPUTERS AT WORK, BY VARIOUS OCCUPATIONS: 1997



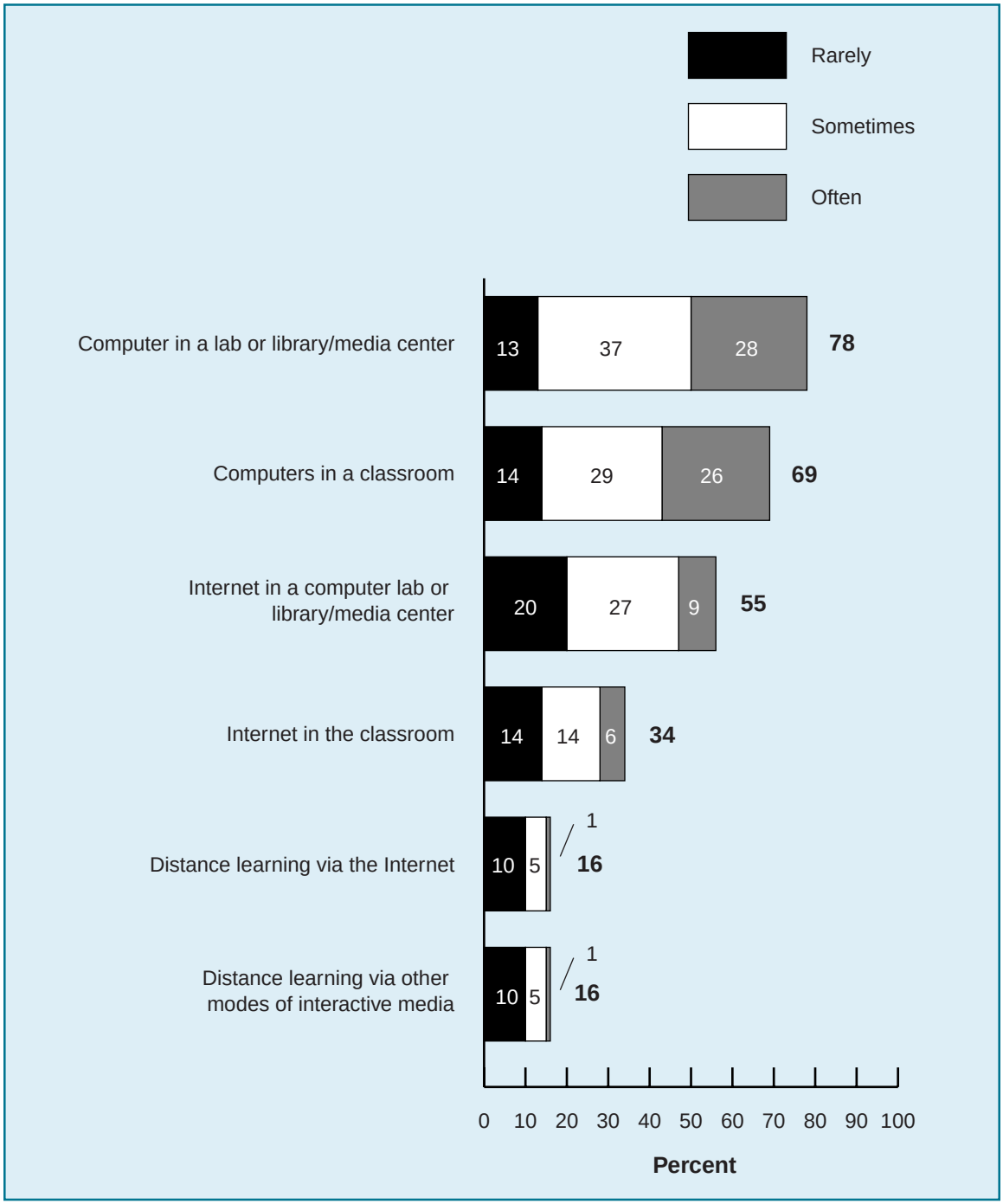
NOTE: "All other occupations" refers to all full-time and part-time employed adults in occupations other than those listed in this figure.

SOURCE: U.S. Census Bureau, Current Population Survey (CPS), October 1997.

percent of teachers indicated that students used computers with Internet access elsewhere in the school often. Sixteen percent of teachers reported that students used other technologies, such as distance learning[3] through the Internet and other interactive media.

Frequency of use by number of computers available. Overall, teachers with more computers or Internet availability in their classrooms reported that they and their students used these technologies more frequently than teachers with fewer computers in their classrooms. For example, 61 percent of teachers with more than five computers in their classrooms reported that students used them often compared with 41 percent of teachers with two to five computers and

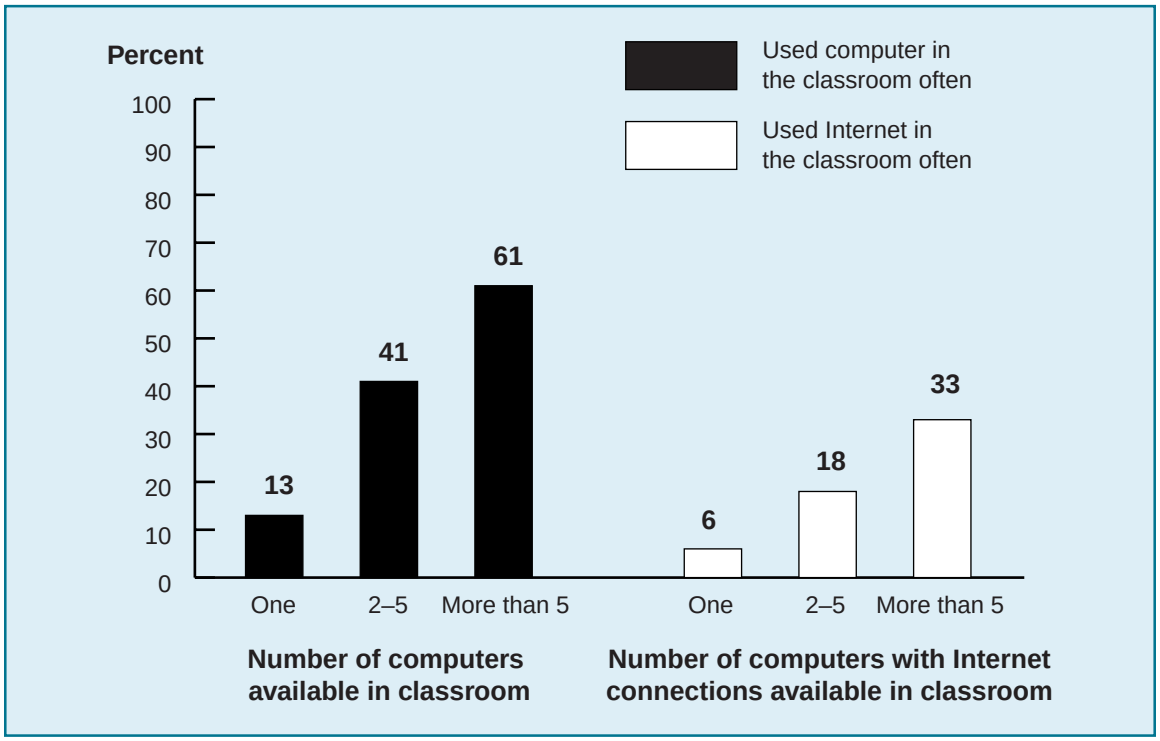
FIGURE 4.8.—PERCENT OF PUBLIC SCHOOL TEACHERS REPORTING STUDENT USE OF VARIOUS TECHNOLOGIES IN SCHOOLS AND CLASSROOMS: 1999



NOTE: Teachers who reported that computers were not available to them in the classroom 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.

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



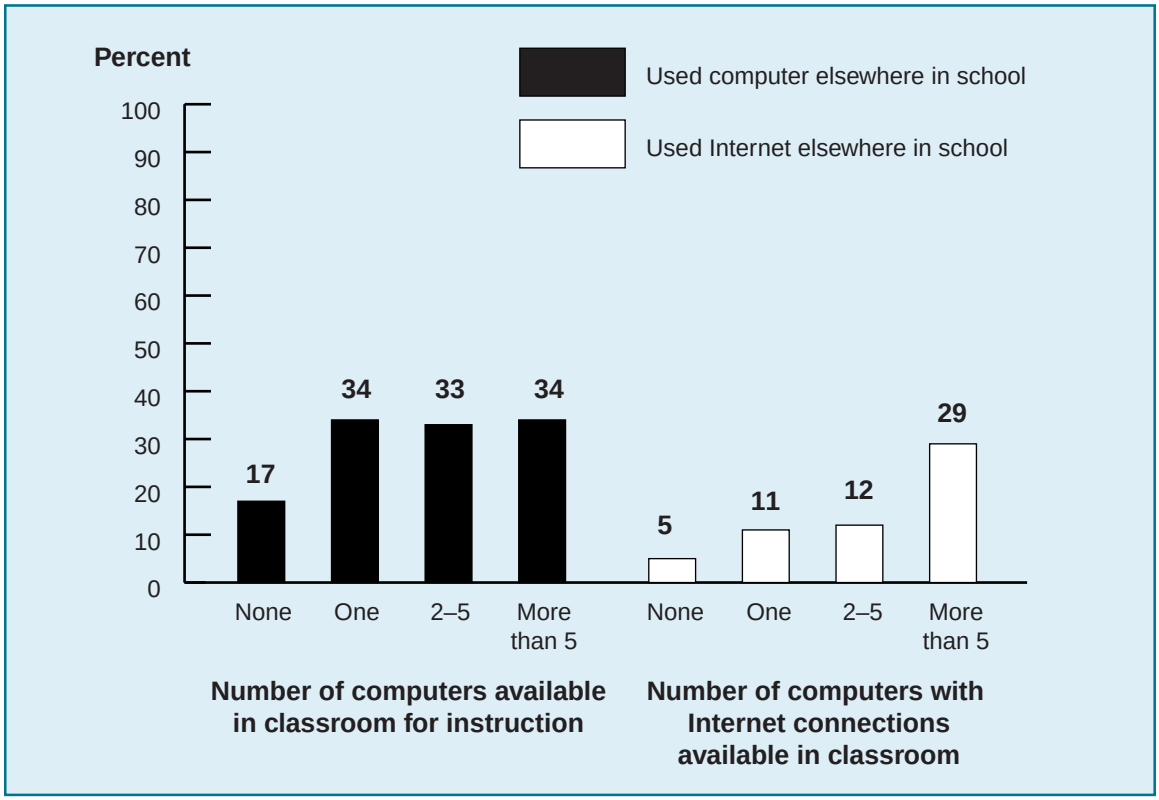
NOTE: Teachers who reported that computers were not available to them in the classroom were excluded from the analyses presented in this figure.

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.

13 percent of teachers with one computer in their classrooms (figure 4.9). Similarly, 33 percent of teachers with more than five classroom computers connected to the Internet reported that students used them often compared with 6 percent of teachers with one classroom computer connected to the Internet. Additionally, teachers with two to five classroom computers connected to the Internet were more likely than teachers with one such computer to report that students used the Internet often (18 percent compared with 6 percent).

Furthermore, teachers with computers in their classrooms reported that students used computers *elsewhere in the school* more often than teachers with no classroom computers (figure 4.10). At least one out of three teachers with computers in their classrooms reported that students used computers elsewhere in the school, compared with one out of six teachers without a classroom computer. Teachers with more than five computers connected to the Internet in their classrooms were two to five times as likely as teachers with one or no computers with Internet connections to report that students used the Internet *elsewhere* in the school (29 percent compared with 5 to 11 percent). Additionally, teachers with one (11 percent), two to five (12 percent), and more than five (29 percent) computers with Internet access in the classroom were more likely than teachers with no computers with Internet access in the classroom (5 percent) to report that their students used the Internet elsewhere in the school.

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



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

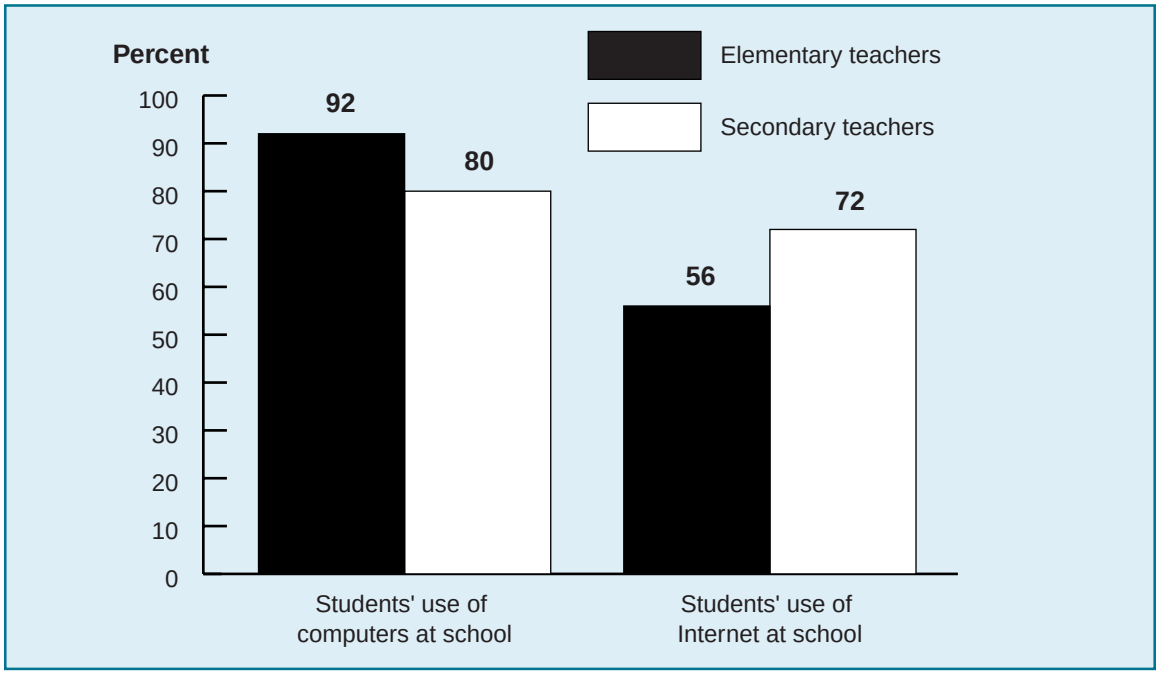
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Frequency of use by teacher and school characteristics. Students' use of technology, as reported by their teachers, varied by teacher and school characteristics. For example, elementary teachers (92 percent) were more likely than secondary teachers (80 percent) to report that their students used computers at school to any extent (figure 4.11). However, secondary teachers (72 percent) were more likely than elementary teachers (56 percent) to report that their students used the Internet at school to any extent.

Furthermore, teachers in schools with lower minority enrollments were generally more likely than teachers in schools with the highest minority enrollments to report that students used the Internet at school. Sixty-four percent of teachers in schools with less than 6 percent minority enrollments and 65 percent of teachers in schools with 6 to 20 percent minority enrollments reported that students used the Internet in school compared with 53 percent of teachers in schools with more than 50 percent minority enrollments (table 4.2).

Similarly, teachers in schools with lower poverty concentrations were generally more likely to report that students used the Internet at school than teachers in the highest poverty schools.

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



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.

Seventy-one percent of teachers in schools with less than 11 percent of students eligible for free or reduced-price lunch, 63 percent of teachers in schools with 11 to 30 percent of eligible students, and 66 percent of teachers in schools with 31 to 49 percent of students eligible for free or reduced-price lunch reported that students used the Internet at school compared with 50 percent of teachers in schools with 71 percent or more students eligible for free or reduced-price lunch.

Current Frequency of Technology Use at Home

Experience using a computer or the Internet may improve teachers' and students' technology skills and increase their level of comfort with technology, regardless of whether the use is at school or at home. In the 1999 FRSS teacher survey of technology use, teachers were asked if a computer, the Internet, or a school network through which they could access the Internet were available to them at home. If they were available, teachers were then asked about the extent to which they used them ("not at all," "small extent," "moderate extent," or "large extent"). Because the FRSS did not ask similar information about students, data from NAEP and CPS are used to describe students' technology use at home.

TABLE 4.2.—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	**61**
Locale	
City	58
Urban fringe	60
Town	64
Rural	64
Percent minority enrollment in school	
Less than 6 percent	64
6 to 20 percent	65
21 to 49 percent	63
50 percent or more	53
Percent of students in school eligible for free or reduced-price school lunch	
Less than 11 percent	71
11 to 30 percent	63
31 to 49 percent	66
50 to 70 percent	56
71 percent or more	50

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.

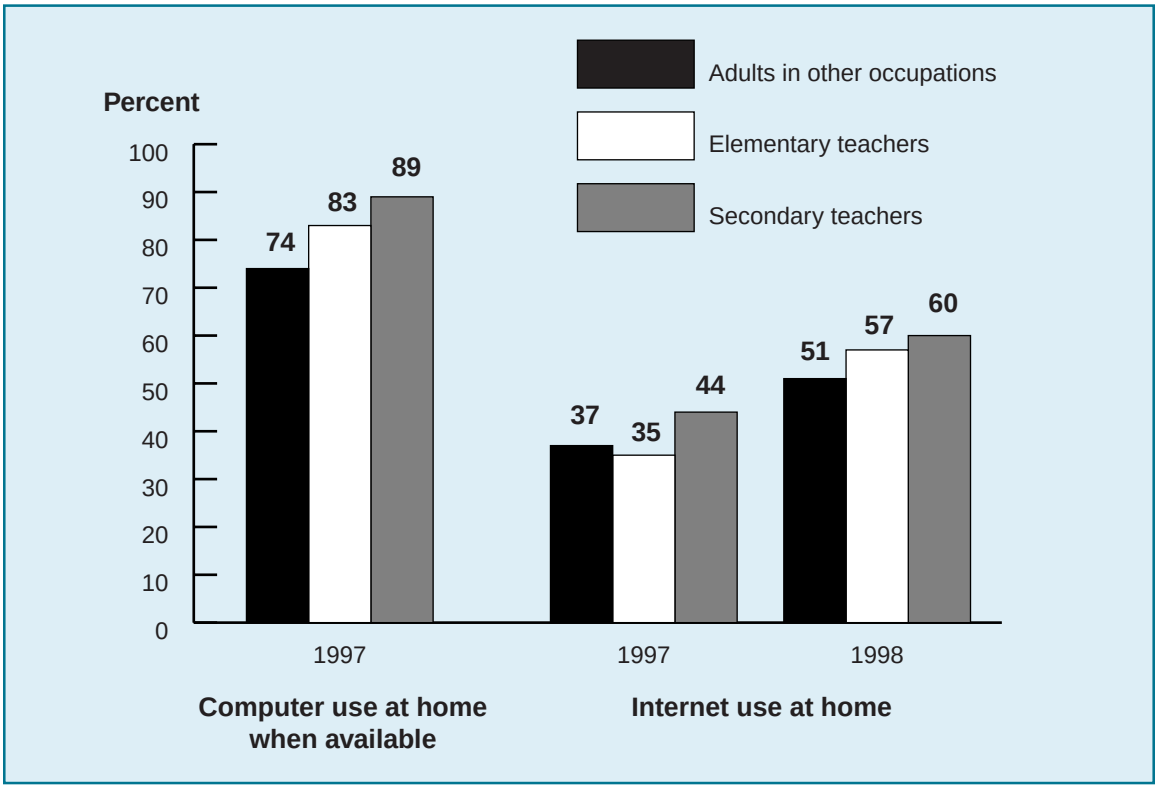
Teacher Use of Computers and the Internet at Home

The 1997 CPS indicates that for public and private school teachers, 83 percent of elementary teachers and 89 percent of secondary teachers used home computers to any extent when they were available (figure 4.12).[4] This compares with 74 percent of adults in other occupations with computers at home who used them to any extent. Two years later, the 1999 FRSS teacher survey indicates that 98 percent of public school teachers with computers at home used them, and about half of the teachers used them to a large extent (table A-4.3).

Teachers' Internet use at home significantly increased between 1997 and 1998 for both elementary and secondary teachers. According to the 1997 CPS, 35 percent of all elementary teachers with computers in their households and 44 percent of all secondary teachers with computers in their households reported using the Internet at home (figure 4.12). In 1998, CPS data show that 57 percent of elementary teachers with computers in their households and 60

[4] Internet availability could not be ascertained from the CPS data.

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



NOTE: Adults who reported that computers were not available to them at home were excluded from the analyses presented in this figure. Availability of the Internet at home could not be determined.

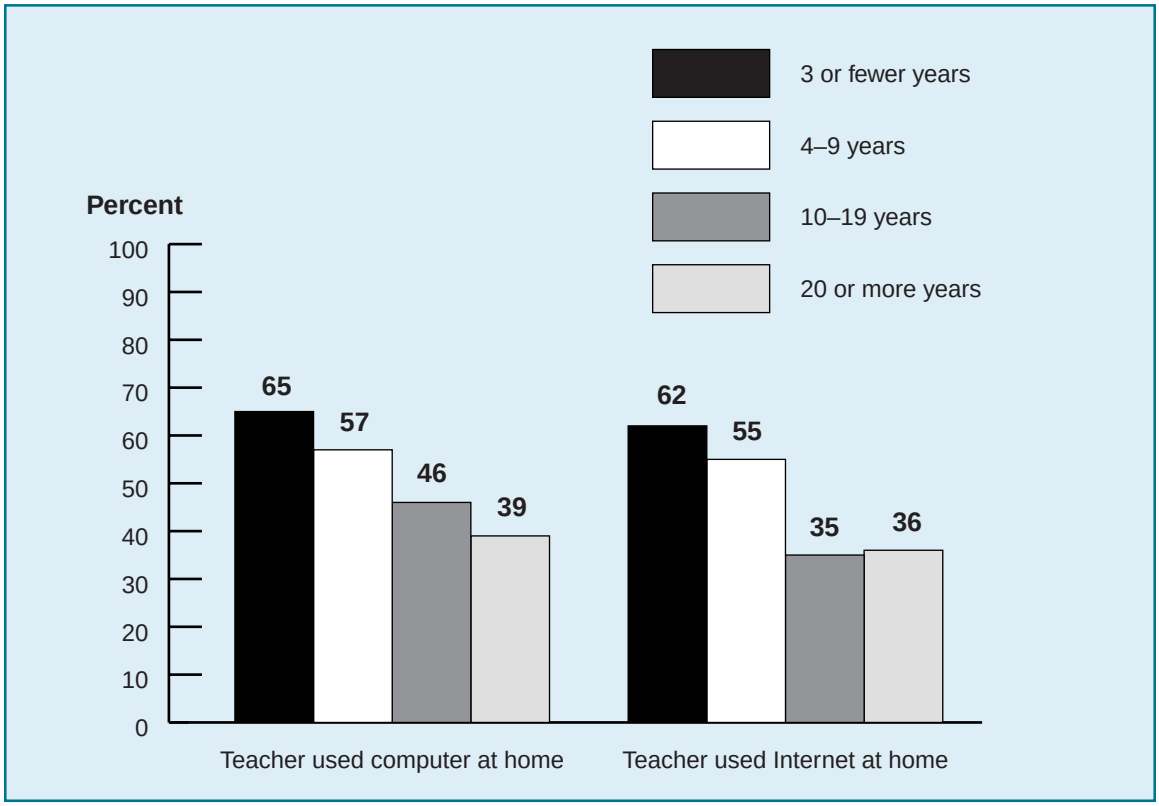
SOURCE: U.S. Census Bureau, Current Population Survey (CPS): October 1997 and December 1998.

percent of secondary teachers with computers in their households reported using the Internet at home. Home Internet use also increased between 1997 and 1998 for adults in other occupations with computers in their households, from 37 to 51 percent.

The 1999 FRSS teacher survey indicates that nearly all (97 percent) public school teachers with the Internet available at home used it, and about two-fifths (43 percent) of teachers with home Internet access reported using it to a large extent. The 1999 FRSS teacher survey also inquired about school networks that teachers can access at home. Fifty-six percent of teachers used this technology when it was available (table A-4.3).

Home use by teacher and school characteristics. Public school teachers' use of computers and the Internet at home varied by their years of teaching experience. For example, teachers with 3 or fewer years and those with 4 to 9 years of teaching experience were more likely to use their home computers to a large extent than teachers with 20 or more years of teaching experience (65 percent and 57 percent, compared with 39 percent—figure 4.13). Similarly, teachers with 3 or fewer years and those with 4 to 9 years of teaching experience were more likely to use the

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



NOTE: Teachers who reported that computers were not available to them at home were excluded from the "Teacher used computer at home" analyses presented in this figure. Teachers who reported that the Internet was not available to them at home were excluded from the "Teacher used Internet at home" analyses presented in this figure.

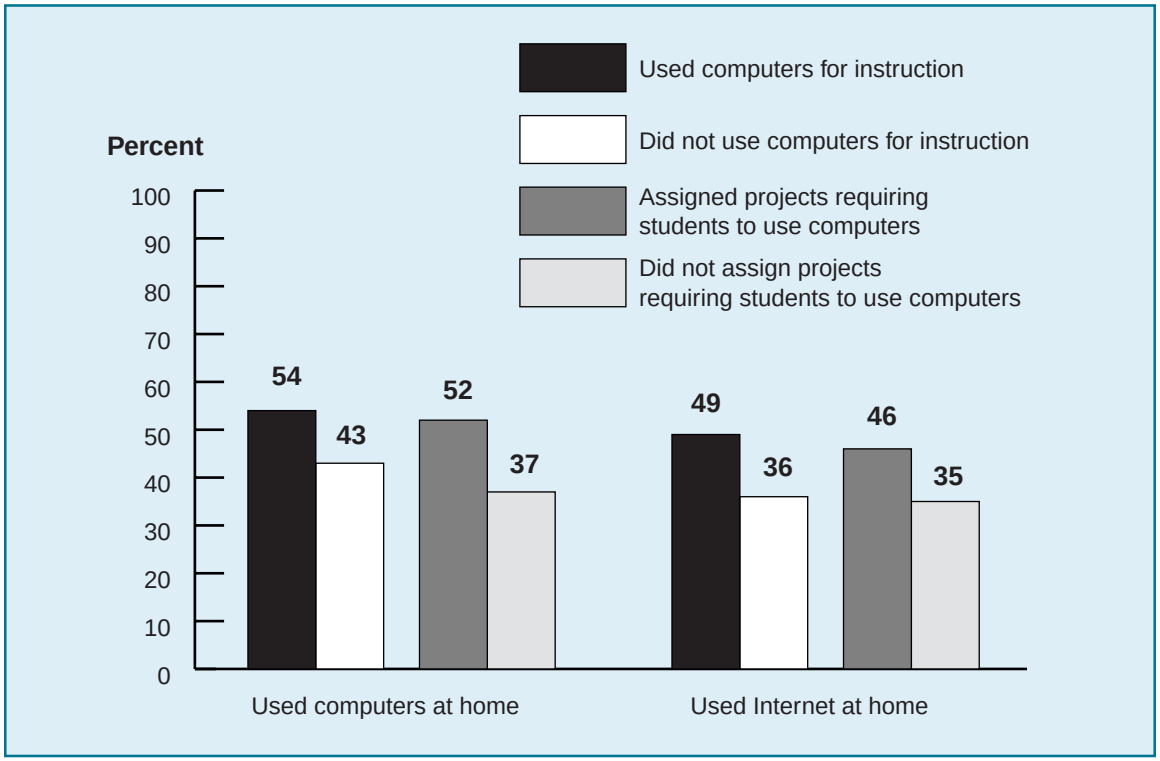
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Internet at home to a large extent than teachers with 10 to 19 years and those with 20 or more years of teaching experience (62 percent and 55 percent compared with 35 percent and 36 percent).

Frequency of Technology Use at Home and Technology Use for Instruction

Public school teachers who used computers for instruction during class and teachers who assigned projects that required their students to use a computer were more likely to use computers and the Internet at home to a large extent than teachers who did not use these technologies for such purposes. For example, 54 percent of teachers who used computers for instruction also used home computers to a large extent, compared with 43 percent of teachers who did not use computers for instruction (figure 4.14). Likewise, 52 percent of teachers who assigned projects requiring students to use computers also used home computers to a large extent, compared with 37 percent of teachers who did not assign such projects. The pattern is similar for Internet use at home.

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



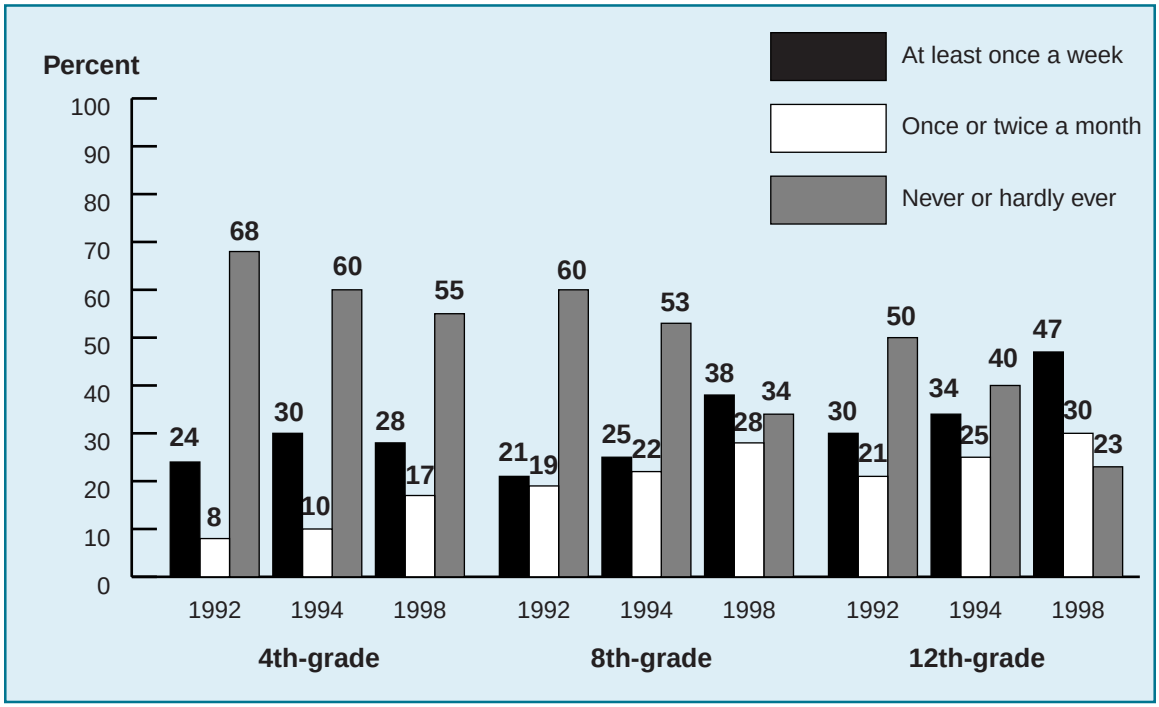
NOTE: Teachers who reported that computers were not available to them at home were excluded from the "Used computers at home to a large extent" analyses presented in this figure. Teachers who reported that the Internet was not available to them at home were excluded from the "Used Internet at home to a large extent" 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.

Student Access to Computers and the Internet at Home

NAEP data indicate that the use of home computers by public school students increased from 1992 to 1998 for fourth-graders, eighth-graders, and twelfth-graders. For example, fourth-graders, eighth-graders, and twelfth-graders who reported never or hardly ever using a computer at home declined between 1992 and 1998 (68 percent to 55 percent, 60 percent to 34 percent, and 50 percent to 23 percent, respectively—figure 4.15).

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



NOTE: Percents may not sum to 100 due to rounding.

SOURCE: National Center for Education Statistics, National Assessment of Educational Progress (NAEP), 1992, 1994, and 1998 Reading Assessments.

Chapter 5

Teacher Preparation and Training

Highlights

- In 1999, one-third of teachers reported feeling very well or well prepared to use computers and the Internet for instruction, with less experienced teachers indicating they felt more prepared to use technology than their more experienced colleagues. For many instructional activities, teachers who reported feeling well prepared or very well prepared to use technology were more likely to use it or assign students to use it than teachers who reported feeling unprepared.

- Teachers cited independent learning most frequently as preparing them for technology use, followed by professional development activities and their colleagues. Whereas half of all teachers reported that college and graduate work prepared them to use technology, less experienced teachers were generally much more likely than their more experienced colleagues to indicate that this education prepared them to use computers and the Internet.

- Most teachers indicated that professional development activities on a number of topics were available to them, including training on software applications, the use of the Internet, and the use of computers and basic computer training. Participation was relatively high in these three activities (ranging from 75 to 83 percent), with more experienced teachers often more likely to participate than less experienced teachers. Teachers indicated that follow-up and advanced training were available less frequently, and approximately half of the teachers reporting that each of these two activities were available to them participated in them.

- Over a 3-year time period, most teachers participated in professional development activities that lasted the equivalent of 4 days or less (i.e., 32 or fewer hours). Teachers who reported spending more time in professional development activities (9 hours or more) were generally more likely than teachers who spent less time in such activities (fewer than 9 hours) to report feeling well or very well prepared to use computers and the Internet for instruction.

CHAPTER 5

Teacher Preparation and Training

The 1999 Fast Response Survey System (FRSS) teacher survey of technology use asked public school teachers a number of questions regarding their preparation and training on the following topics: their feelings of preparedness, the extent to which various training sources contributed to their understanding of technology (e.g., colleagues, independent learning), their participation in a number of different types of professional development activities and the length of their participation, and the supports they received for participating in training activities.

Teachers' Feelings of Preparedness

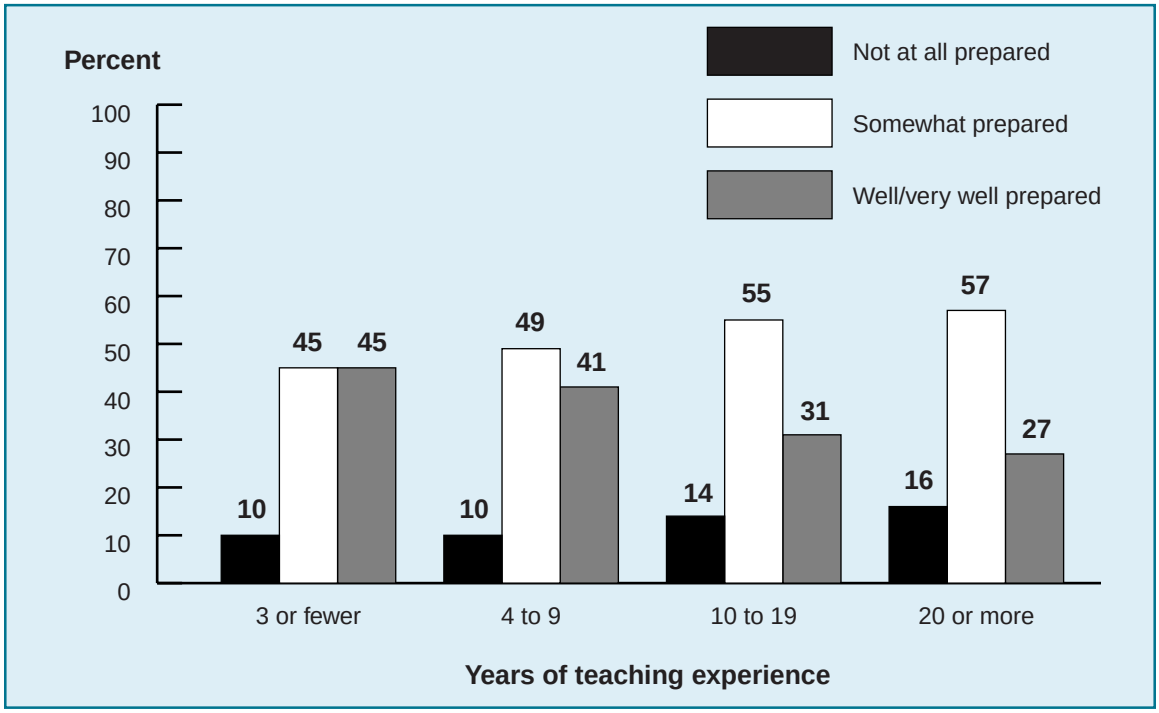
In 1999, 10 percent of teachers reported feeling "very well prepared," and 23 percent reported feeling "well prepared" to use computers and the Internet for classroom instruction. At least half of teachers reported feeling "somewhat prepared" to use these technologies for instruction (53 percent), and 13 percent reported feeling "not at all prepared" to use these technologies for instruction (table A-5.5).

Teachers' feelings of preparation varied by their years of teaching experience. For example, teachers with 3 or fewer years of teaching experience were generally more likely to report that they felt well prepared or very well prepared, compared with teachers with more years of teaching experience (45 percent compared with 31 percent of teachers with 10 to 19 years and 27 percent of teachers with 20 or more years of teaching experience—figure 5.1).

Preparedness and Teachers' Use of Technology

For many instructional activities, teachers who reported feeling better prepared to use technology were more likely to use it than teachers who indicated that they felt unprepared. Specifically, teachers who reported feeling well prepared or very well prepared were more likely than teachers who reported feeling unprepared to create instructional materials

FIGURE 5.1.—PERCENT OF PUBLIC SCHOOL TEACHERS 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



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.

(88 percent compared with 50 percent), gather information for planning lessons (71 percent compared with 28 percent), access model lesson plans (47 percent compared with 12 percent), access research and best practices for teaching (52 percent compared with 11 percent), create multimedia presentations for the classroom (55 percent compared with 12 percent), and perform administrative record keeping (62 percent compared with 34 percent). They were also more likely to communicate via e-mail with colleagues, students' parents, and students outside the classroom, as well as post homework or project information (table 5.1).

Teachers' use of technology for classroom assignments is also related to their feelings of preparedness. For each classroom instructional activity, teachers who reported feeling well prepared or very well prepared were more likely than teachers who reported feeling unprepared to report assigning students to use these technologies. For example, 66 percent of teachers who reported feeling well prepared or very well prepared to use technology indicated that they assigned students to use computers or the Internet to solve problems or analyze data, compared with 47 percent of teachers who reported feeling somewhat prepared and 14 percent of teachers who reported feeling unprepared (table 5.2).

Teacher Preparation and Training

Because teachers' use of technology is related to their feelings of preparedness, it is important to understand teachers' training for technology use and how that relates to their feelings of prepared-

TABLE 5.1.—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	**78**	**59**	**34**	**37**	**36**
Not at all	50	28	12	11	12
Somewhat	80	59	31	34	30
Well/very well	88	71	47	52	55

See note at end of table.

TABLE 5.1.—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	**51**	**50**	**25**	**12**	**17**
Not at all	34	28	9	4	9
Somewhat	48	48	24	10	17
Well/very well	62	63	32	17	20

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.

ness. This section examines a number of different types of information about teachers' training and preparation, including their sources of training, the availability of professional development in their schools and their participation in these activities, and the support and guidance they receive to facilitate their training.

Sources of Training

The 1999 teacher survey on technology use asked teachers to report the extent to which a number of sources prepared them to use computers and the Internet, including college and graduate work, professional development, colleagues, students, and independent learning. The

TABLE 5.2.—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	**50**	**50**	**61**	**43**
Not at all	20	14	27	19
Somewhat	49	47	56	37
Well/very well	63	66	80	63

TABLE 5.2.—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	**39**	**45**	**48**	**51**
Not at all	14	23	19	23
Somewhat	32	38	44	46
Well/very well	59	63	66	68

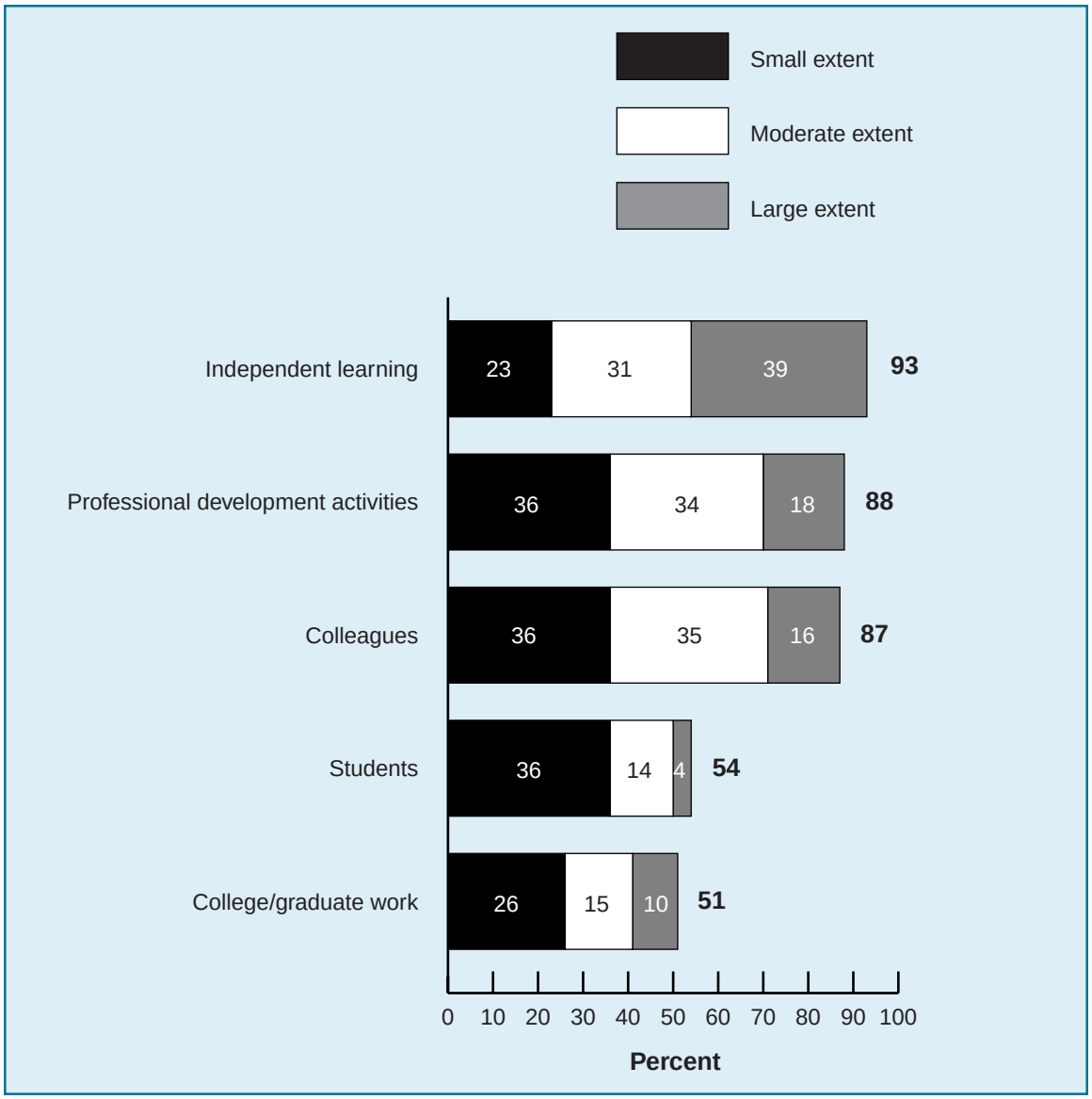
NOTE: Teachers who reported that computers were not available to them anywhere in the school were excluded from the analyses presented in this table.

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.

most frequently cited sources of preparation were independent learning (93 percent of teachers indicated that independent learning prepared them to any extent), professional development activities (88 percent), and colleagues (87 percent—figure 5.2). Furthermore, approximately half of all public school teachers reported that students and college/graduate work prepared them to use computers or the Internet to any extent (54 percent and 51 percent, respectively).

Teachers with fewer years of teaching experience were generally more likely than their more experienced colleagues to indicate that college/graduate work prepared them to use computers and the Internet to any extent. Eighty-four percent of teachers with 3 or fewer years and 76 percent of teachers with 4 to 9 years of teaching experience reported that college/graduate work prepared them to use these technologies to any extent, compared with 44 percent of teachers with 10 to 19 years and 31 percent of teachers with 20 or more years of teaching experience (figure 5.3).

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



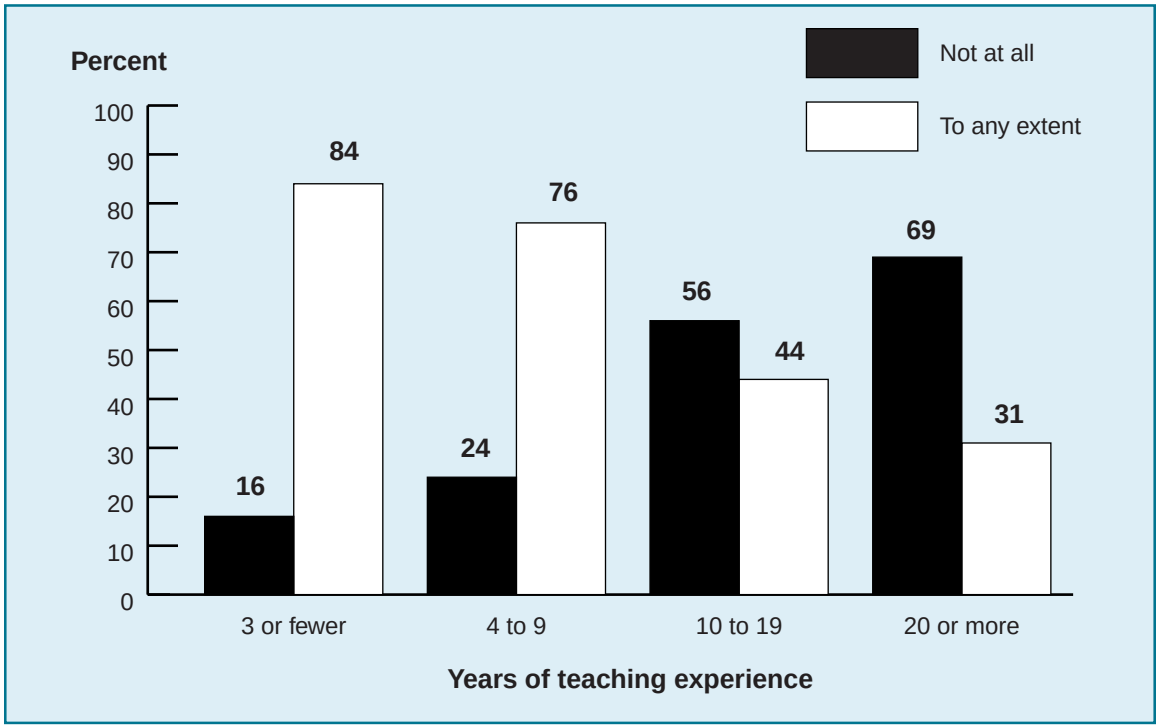
NOTE: Detail may not sum to totals due to rounding.

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.

Professional Development

The 1999 teacher survey of technology use asked a number of questions about professional development availability and participation. Specifically, the survey asked teachers if the following types of professional development activities were available to them and if they participated in these activities: use of computers and basic computer training, software applications, use of the Internet, integration of technology into the curriculum and classroom instruction, follow-up and/or advanced training, and use of other advanced telecommunications.

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



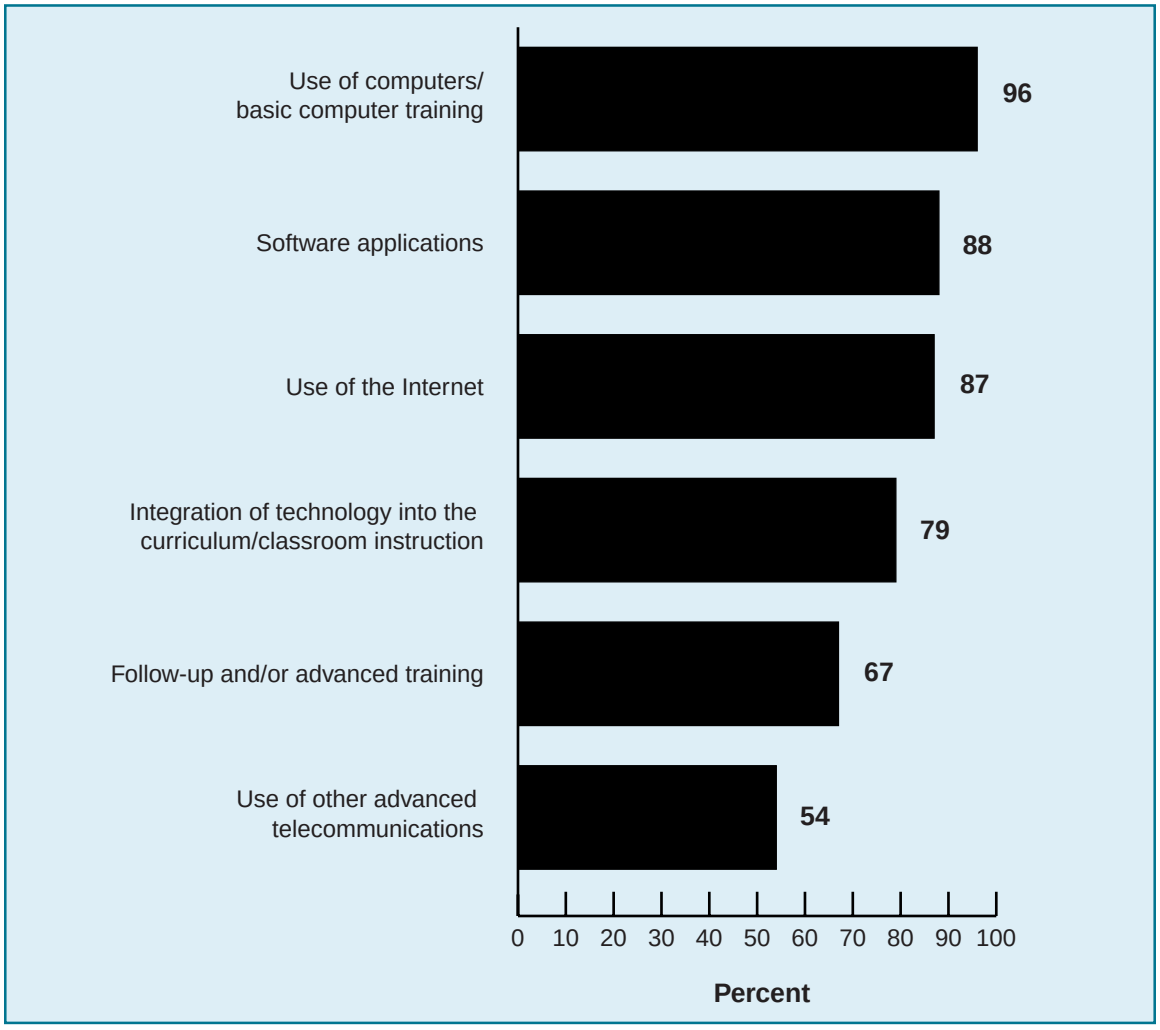
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

Availability. Teachers reported that professional development training on the use of computers and basic computer training was the type most likely to be available to them (96 percent), followed by software applications (88 percent), use of the Internet (87 percent), and integration of technology into the curriculum and classroom instruction (79 percent—figure 5.4). Teachers were least likely to report that follow-up and/or advanced training and use of other advanced telecommunications were available to them (67 percent and 54 percent, respectively).

Ninety-one percent of teachers in schools with 6 to 20 percent minority enrollments and 90 percent of teachers in schools with 21 to 49 percent minority enrollments reported that such training was available to them, compared with 81 percent of teachers in schools with 50 percent or more minority enrollments (figure 5.5). Furthermore, 94 percent of teachers in schools with less than 11 percent of the students eligible for free or reduced-price school lunch, 90 percent of teachers in schools with 11 to 30 percent of students eligible, and 91 percent of teachers in schools with 31 to 49 percent of students eligible for free or reduced-price school lunch reported that training in the use of the Internet was available to them, compared with 80 percent of teachers in schools with 50 to 70 percent of students eligible and 79 percent of teachers in schools with more than 70 percent of students eligible for free or reduced-price school lunch.

Participation. Among teachers who reported the availability of each professional development activity, participation during the last 3 years was highest in the use of computers and basic

FIGURE 5.4.—PERCENT OF PUBLIC SCHOOL TEACHERS REPORTING THE AVAILABILITY OF PROFESSIONAL DEVELOPMENT TRAINING ACTIVITIES FOR VARIOUS USES AND APPLICATIONS OF TECHNOLOGY: 1999

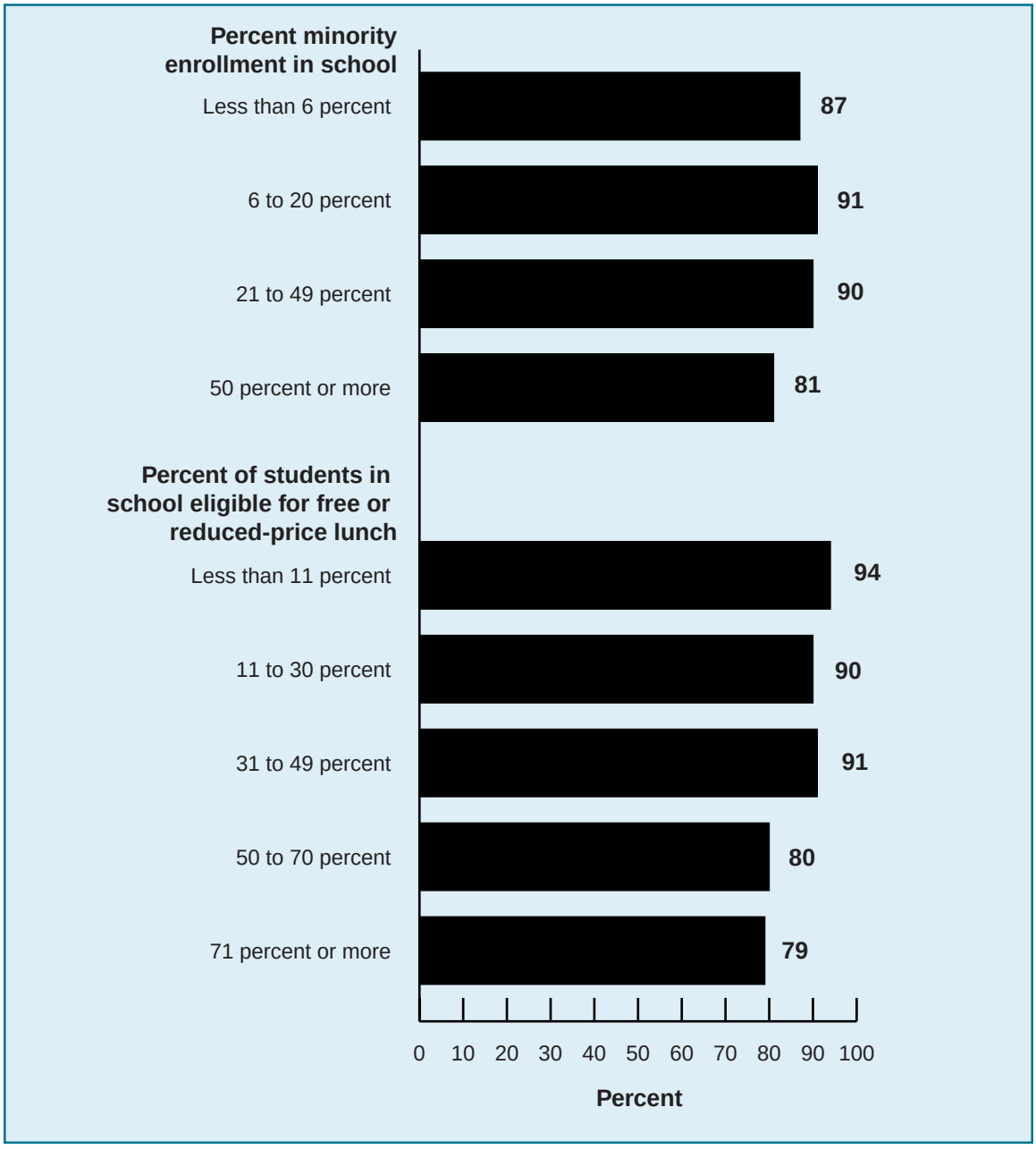


SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," FRSS 70, 1999.

computer training (83 percent) and software applications (81 percent), followed by use of the Internet (75 percent) and integration of technology into the curriculum and classroom instruction (74 percent—figure 5.6). Approximately half of the teachers who reported that follow-up and/or advanced training or the use of other advanced telecommunications were available to them participated in these activities (55 percent and 53 percent, respectively).

In general, teachers with more years of teaching experience were more likely to report having participated in basic computer use and software applications professional development activities than their less experienced colleagues. For example, 87 percent of teachers with 10 to 19 years of teaching experience and 90 percent of teachers with 20 or more years of teaching experience participated in computer use and basic computer training activities, compared with 63 percent of teachers with 3 or fewer years and 77 percent of teachers with 4 to 9 years of teaching experience (table 5.3).

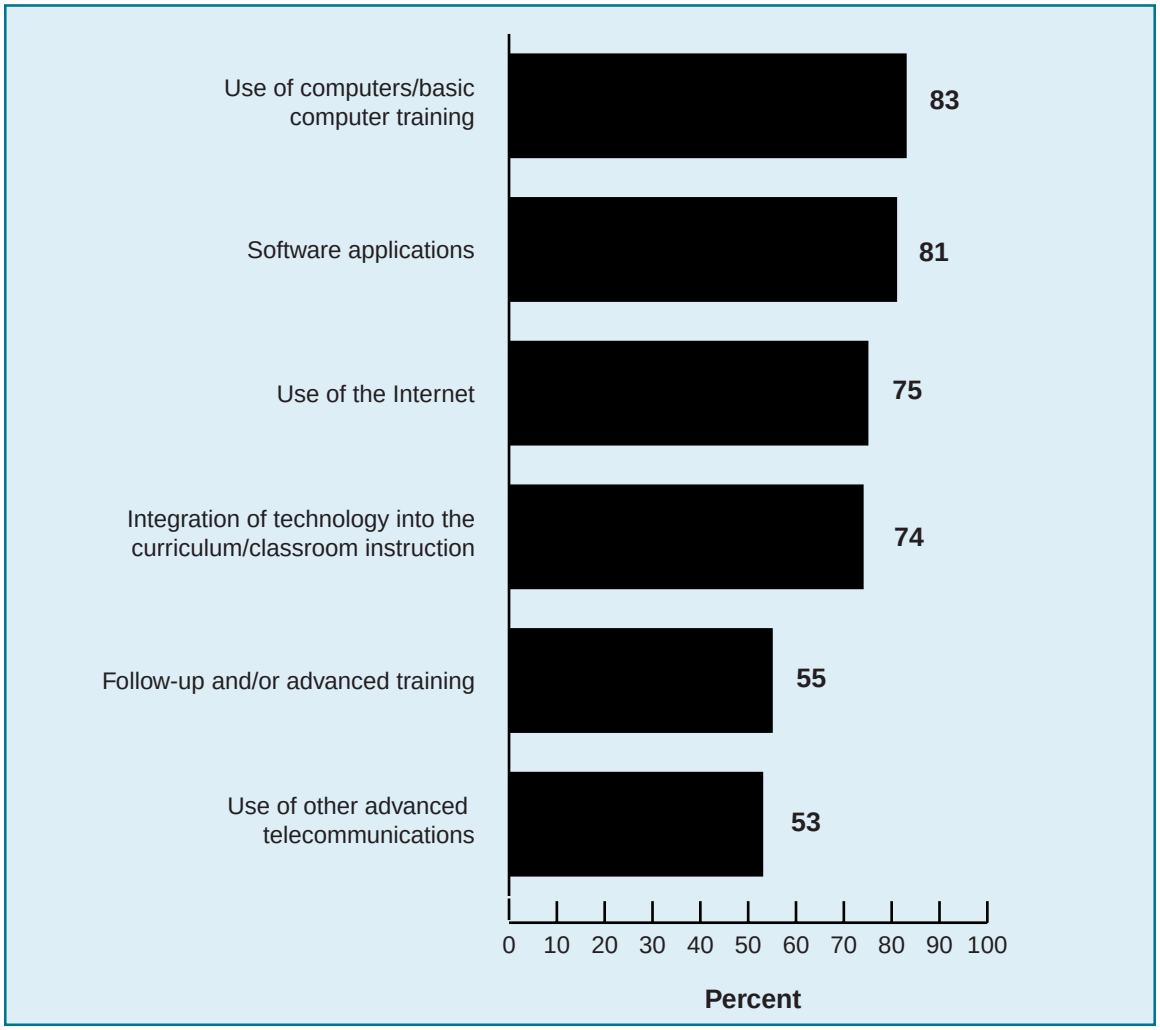
FIGURE 5.5.—PERCENT OF PUBLIC SCHOOL TEACHERS REPORTING THE AVAILABILITY OF TRAINING IN THE USE OF THE INTERNET, BY PERCENT MINORITY ENROLLMENT IN SCHOOL AND PERCENT OF STUDENTS IN SCHOOL ELIGIBLE FOR FREE OR REDUCED-PRICE SCHOOL LUNCH: 1999



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.

Time spent in professional development activities. The 1999 teacher survey of technology use also asked teachers the number of hours they participated in professional development activities in the use of computers or the Internet during the last 3 years. Forty-three percent of teachers participated in such professional development activities for 1 to 8 hours, 34 percent participated for 9 to 32 hours, and 12 percent participated in such activities for more than 32 hours

FIGURE 5.6.—PERCENT OF PUBLIC SCHOOL TEACHERS REPORTING PARTICIPATING IN VARIOUS TYPES OF TRAINING, WHEN AVAILABLE: 1999



NOTE: Teachers reporting not having the listed types of training available were excluded from their respective analyses presented in this figure. The listed types of training were available to the following percentages of public school teachers: Use of computers/basic computer training, 96 percent; Software applications, 88 percent; Use of the Internet, 87 percent; Integration of technology into curriculum/ classroom instruction, 79 percent; Follow-up and/or advanced training, 67 percent; Use of other advanced telecommunications, 54 percent.

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.

(figure 5.7). One in ten teachers indicated that they did not participate in any such professional development activities.

Preparedness and time spent in professional development activities. Teachers who spent more time in professional development activities were generally more likely than teachers who spent less time in such activities to indicate they felt prepared to use computers and the Internet for instruction. Specifically, teachers who reported spending more than a day (9 hours or more) in professional development were more likely to report feeling well prepared or very well prepared

TABLE 5.3.—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	63	77	87	90
Software applications	64	78	85	84
Use of the Internet	65	74	75	78
Use of other advanced telecommunications (e.g., interactive audio, video, closed-circuit TV)	44	56	56	52
Integration of technology into the curriculum/ classroom instruction	66	74	77	75
Follow-up and/or advanced training	46	61	58	53

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.

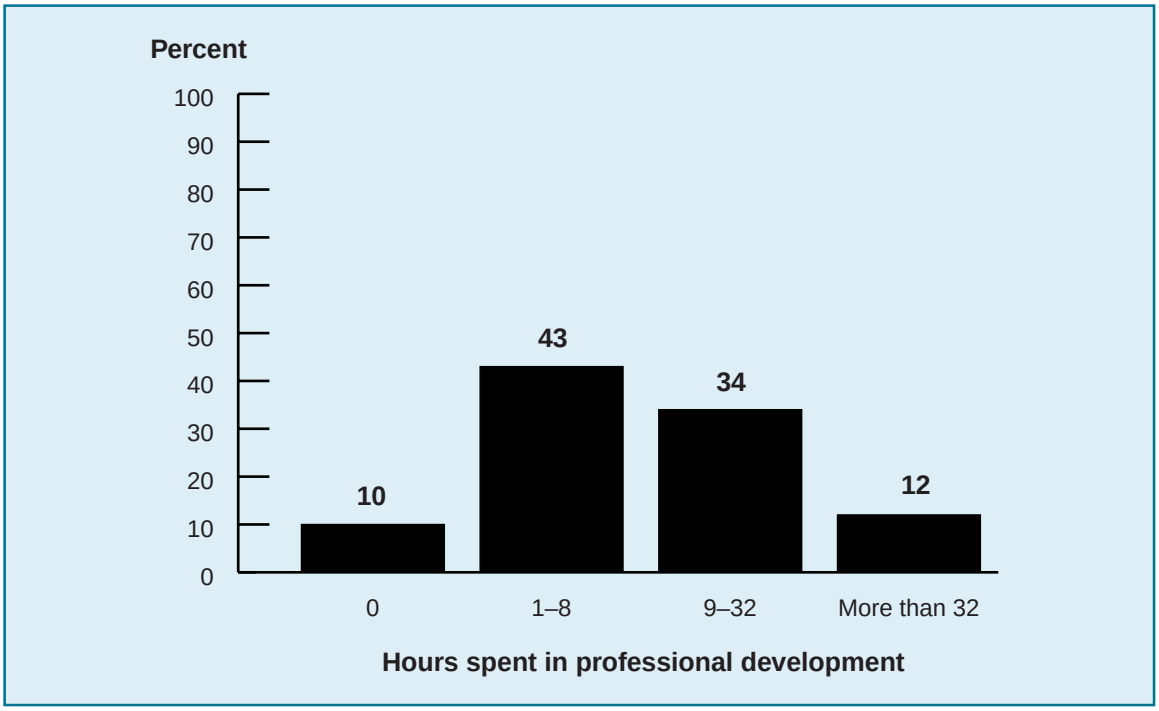
to use computers or the Internet than those who reported spending a day or less (fewer than 9 hours) in such activities (table 5.4).

Support and Guidance for Participation in Technology Training

In addition to asking teachers about their training and preparation in the use of technology, the 1999 teacher survey of technology use also asked teachers if the following types of incentives were available to them for participation in professional development: course credit toward certification, additional resources for the teacher or classroom, paid expenses, release time, stipends, or connection to the Internet from home.

Approximately half of all teachers reported that course credit toward certification and additional resources were offered as incentives to participate in technology training (56 percent and 46 percent, respectively—figure 5.8). About two-fifths of teachers reported having paid expenses (40 percent) and release time and stipends (39 percent) as incentives. In addition, about one in five teachers reported that connections to the Internet from home were offered (22 percent).

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



NOTE: Percents may not sum to 100 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.

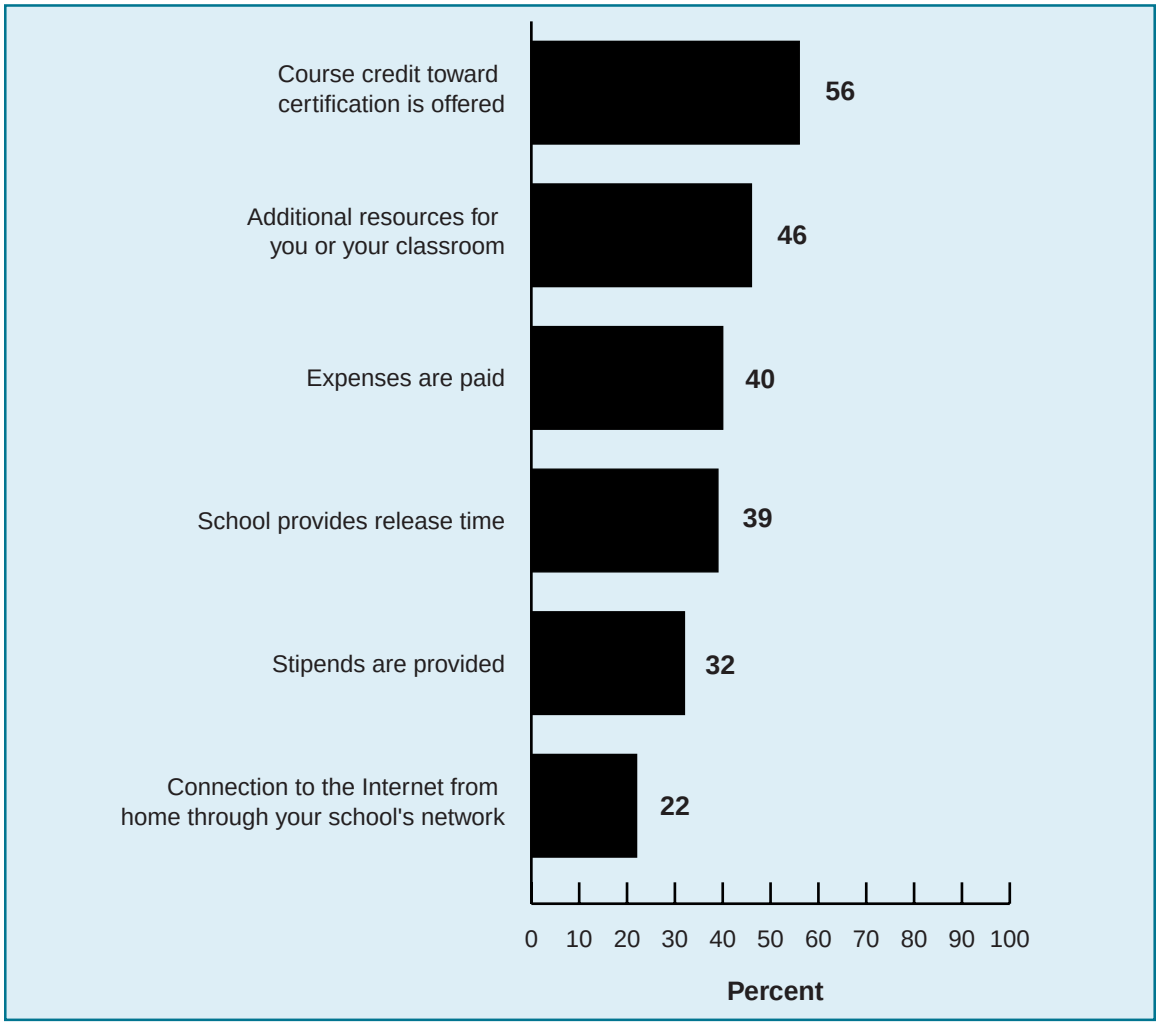
TABLE 5.4.—PERCENT OF PUBLIC SCHOOL TEACHERS REPORTING FEELING PREPARED TO VARIOUS EXTENTS TO USE COMPUTERS AND THE INTERNET FOR INSTRUCTION, BY HOURS SPENT IN PROFESSIONAL DEVELOPMENT: 1999

Hours of professional development	Teachers' feelings of preparedness		
	Not at all	Somewhat	Well/very well
All public school teachers	**13**	**53**	**33**
0 hours	32	47	22
1-8 hours	19	55	26
9-32 hours	5	61	34
More than 32 hours	2	32	66

NOTE: Detail may not sum to 100 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.

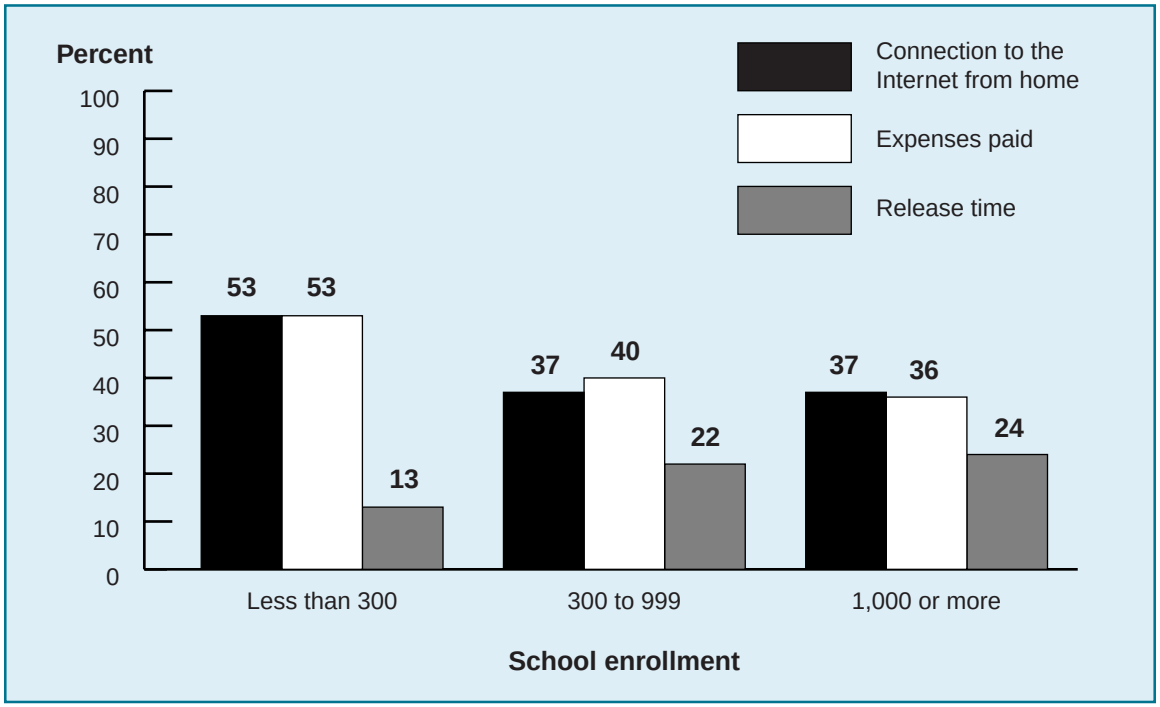
FIGURE 5.8.—PERCENT OF PUBLIC SCHOOL TEACHERS REPORTING THE AVAILABILITY OF CERTAIN INCENTIVES FROM THE SCHOOL DISTRICT FOR PARTICIPATION IN PROFESSIONAL DEVELOPMENT: 1999



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.

Teachers in small schools were more likely than teachers in larger schools to report the availability of such incentives as release time and paid expenses. For example, about half (53 percent) of the teachers in schools with less than 300 students reported the availability of release time, compared with a little over one-third (37 percent) of teachers in schools with 300 to 999 students and schools with 1,000 or more students (figure 5.9). On the other hand, teachers in medium and large schools were more likely than teachers in small schools to report the availability of connections to the Internet from home as an incentive to participate in technology training (22 percent and 24 percent, respectively, compared with 13 percent).

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



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.