

# Survey Methodology

---

## Sample Selection

The sampling frame for the Fast Response Survey System (FRSS) *Survey on Advanced Telecommunications in U.S. Private Schools: 1998-1999* was constructed from the 1997-98 National Center for Education Statistics (NCES) Private School Survey (PSS) Universe File, the most recent file available at the time the sample was selected. The PSS Universe File has two components: list frame and area sample. The complete file represents 27,402 schools, including 8,182 Catholic schools, 13,195 schools with religious affiliations other than Catholic, and 6,025 nonsectarian schools. By level, the file represents 16,623 elementary schools, 2,487 secondary schools, and 8,292 schools with combined elementary/secondary grades.

A private school was defined as a school not in the public system that provides instruction for any of grades 1 through 12 (or comparable ungraded levels) where the instruction was not provided in a private home. All regular private elementary, secondary, and combined schools in the 50 states and the District of Columbia were included in the sampling frame while outlying territories were excluded. Special education, vocational, early childhood/day care, alternative schools, and schools having a high grade of prekindergarten, transitional kindergarten, kindergarten, or ungraded were excluded from the frame prior to sampling. Thus, the final sampling frame included 24,128 eligible private schools enrolling over 5.3 million students.

The primary sampling strata were defined by level (elementary, secondary, combined), affiliation (Catholic, other religious, nonsectarian), and school enrollment size class (under 100, 100-299, 300-499, 500-999, 1,000 or more). Within these primary strata, schools were also sorted by type of locale (city, urban fringe, town, and rural). Within each

instructional level, the schools were allocated to “substrata” defined by affiliation and school size class in rough proportion to the aggregate square root of enrollment in the “substratum” to form the primary strata. Schools were then selected from each primary stratum with probabilities proportional to  $w_i$ , where  $w_i$  is the weight reflecting the school’s probability of inclusion in the area sample (for schools in the PSS list frame,  $w_i = 1$ ). The within-stratum sampling rates were designed to yield self-weighted samples of schools in each primary stratum. Although the samples were self-weighted within primary strata, the overall probabilities varied by school size, with larger schools having higher probabilities of selection than smaller ones. Such a design is reasonably efficient for estimating the proportion or number of schools with specified characteristics (e.g., the proportion of private schools with access to the Internet), as well as statistics that are correlated with enrollment (e.g., the percent of private school students or teachers who have access to the Internet).

## Respondents and Response Rates

In February 1999, survey instruments were mailed to the heads/principals of a sample of 999 private schools. They were asked to forward the questionnaire to the person most knowledgeable about the availability and use of advanced telecommunications at the school. The accompanying instructions requested that the respondent complete the self-administered questionnaire and return it by mail using the postage-paid envelope or by fax using a toll-free number. Telephone followup was conducted with schools that did not complete the survey. Sixteen schools were outside of the scope of the survey and 850 schools completed the survey (Table A-1). Thus the final unweighted response rate was 86 percent (850 of 983 eligible schools). The weighted response rate was 84 percent. The weighted item nonresponse

**Table A-1.—Number and percentage distribution of private schools in the study, and estimated number and percentage distribution of schools in the nation, by selected school characteristics: School year 1998-99**

School characteristic	Respondent sample		National estimate	
	Number	Percent	Number	Percent
All private schools .....	850	100	23,454	100
Affiliation				
Catholic .....	361	42	8,024	34
Other religious .....	316	37	11,397	49
Nonsectarian .....	164	19	3,371	14
Instructional level				
Elementary .....	440	52	15,263	65
Secondary .....	227	27	2,310	10
Combined .....	183	22	5,881	25
Internet access				
Has access .....	661	78	15,623	67
No access .....	189	22	7,831	33
Enrollment size				
Less than 150 .....	223	26	10,402	44
150 to 299 .....	233	27	6,832	29
300 or more .....	388	46	5,707	24
Type of locale				
City .....	395	47	9,213	39
Urban fringe .....	305	36	8,254	35
Town .....	92	11	3,370	14
Rural .....	58	7	2,617	11
Geographic region				
Northeast .....	225	26	5,453	23
Southeast .....	179	21	4,893	21
Central .....	243	29	7,292	31
West .....	203	24	5,816	25
Percent minority enrollment				
Less than 6 percent .....	188	22	5,969	25
6 to 20 percent .....	296	35	7,086	30
21 to 49 percent .....	187	22	4,546	19
50 percent or more .....	157	18	4,746	20

NOTE: Details may not add to totals because of rounding or missing data. There were small amounts of missing data for the following variables: affiliation (9 cases), enrollment size (6 cases), and percent minority enrollment (22 cases).

SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Survey on Advanced Telecommunications in U.S. Private Schools: 1998-99," FRSS 68, 1999.

rate for individual questionnaire items rose above 3 percent for 10 questionnaire items (out of a possible 209 questionnaire items).

## Sampling and Nonsampling Errors

Survey responses were weighted to produce national estimates. The sampling weights reflect each school's overall probability of selection and include upward adjustments to compensate for differential nonresponse. The findings in the survey report (*Advanced Telecommunications in U.S. Private Schools: 1998-99*) are estimates based on the sample selected and, consequently, are subject to sampling variability.

The standard error is the measure of the variability of estimates due to sampling. It indicates the variability of a sample estimate that would be obtained from all possible samples of a given design and size. Standard errors are used as a measure of the precision expected from a particular sample. If all possible samples were surveyed under similar conditions, intervals of 1.96 standard errors below to 1.96 standard errors above a particular statistic would include the true population parameter being estimated in about 95 percent of the samples. This is a 95 percent confidence interval. For example, the estimated percentage of private schools with Internet access in 1998-99 was 67 percent, and the standard error was 2.1 percent. The 95 confidence interval for the statistic extends from  $67 - (2.1 \times 1.96)$  to  $67 + (2.1 \times 1.96)$ , or from 63 percent to 71 percent.

To properly reflect the complex features of the sample design, standard errors of the survey-based estimates were calculated using jackknife replication. Under the jackknife replication approach, 50 subsamples or "replicates" were formed in a way that preserved the basic features of the full sample design. A set of estimation weights (referred to as "replicate weights") were then generated for each jackknife replicate. Using the full sample weights and the replicate weights, estimates of survey statistics were calculated for the full sample and each of the 50 jackknife replicates. The sum of the squared deviations of the replicates then provided a

measure of the variance (standard error) of the survey statistics.

The survey estimates are also subject to nonsampling errors that can arise because of nonobservation (nonresponse or noncoverage) errors, errors of reporting, and errors made in collection of the data. These errors can sometimes bias the data. Nonsampling errors may include such problems as the differences in the respondents' interpretation of the meaning of the questions; memory effects; misrecording of responses; incorrect editing, coding, and data entry; differences related to the particular time and place the survey was conducted; or errors in data preparation. While general sampling theory can be used in part to determine how to estimate the sampling variability of a statistic, nonsampling errors are difficult to measure and, for measurement purposes, usually require that an experiment be conducted as part of the data collection procedures or that data external to the study be used.

To minimize the potential for nonsampling errors, the survey was pretested with private school technology directors and coordinators and other individuals knowledgeable about the availability and use of advanced telecommunications. During the survey design process and the survey pretest, an effort was made to check for consistency of interpretation of questions and to eliminate ambiguous terms as a result. The questionnaire and instructions were extensively reviewed by NCES. Manual and machine editing of the questionnaire responses were conducted to check the data for accuracy and consistency. Cases with missing or inconsistent items were recontacted by telephone to resolve problems. Data were keyed with 100 percent verification.

## Definitions of Analysis Variables

**School affiliation** - Schools were classified according to their affiliation as identified on the 1997-98 Private School Survey (PSS) Universe File.

**Catholic** - schools affiliated with the Catholic Church.

**Other religious** - schools affiliated with religions or with a religious orientation other than Catholic.

**Nonsectarian** - schools that are not affiliated with a church or did not have a religious orientation.

**School instructional level** - Schools were classified according to their grade span in the 1997-98 PSS Universe File.

**Elementary** - a school that had grade 6 or lower, or "ungraded" and no grade higher than 8th. This category includes schools composed of students in grades 1 through 6, students in grades 7 and 8 when the remainder of the students in the school are in the lower grades or are ungraded, and students in ungraded classes in schools with no grade higher than the 8th grade.

**Secondary** - a school that had no grade lower than the 7th, or "ungraded" and had grade 7 or higher. This category includes schools composed of students in grades 9 through 12, students in grades 7 and 8 when the remainder of the students in the school are in grades above 8th or are ungraded, and students in ungraded classes in schools with no grade lower than 7th.

**Combined** - a school that has grades higher than the 8th and lower than the 7th. This category includes schools composed of students in any grade in schools that range below grade 7 and above grade 8, or of students that are all in ungraded classes.

**School enrollment size** - total number of students enrolled as defined by the 1997-98 PSS Universe File.

**Less than 150**  
**150-299**  
**300 or more**

**Type of locale** - as defined in the 1997-98 PSS Universe File.

**City** - a central city of a Standard Metropolitan Statistical Area (SMSA).

**Urban fringe** - a place within an SMSA of a large or mid-size central city and defined as urban by the U.S. Bureau of the Census.

**Town** - a place not within an SMSA, but with a population greater than or equal to 2,500, and defined as urban by the U.S. Bureau of the Census.

**Rural** - a place with a population less than 2,500 and defined as rural by the U.S. Bureau of the Census.

**Geographic region** - One of four regions used by the Bureau of Economic Analysis of the U.S. Department of Commerce, the National Assessment of Educational Progress, and the National Education Association. Obtained from the 1997-98 PSS Universe File.

**Northeast** - Connecticut, Delaware, District of Columbia, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont.

**Southeast** - Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia.

**Central** - Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin.

**West** - Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oklahoma, Oregon, Texas, Utah, Washington, and Wyoming.

**Percent minority enrollment** - The percent of students enrolled in the school whose race or ethnicity is classified as one of the following: American Indian or Alaska Native; Asian or Pacific Islander; Black, non-Hispanic; or Hispanic, based on data in the 1997–98 PSS Universe File.

**Less than 6 percent**  
**6 to 20 percent**  
**21 to 49 percent**  
**50 percent or more**

**Internet access** – The percent of schools with Internet access as determined by question 3A on the questionnaire.

**Yes**  
**No**

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