Section B. Description of Statistical Methodology

B.1.   Respondent Universe and Sample Design

The Quick Response Information System (QRIS) consists of the Fast Response Survey System (FRSS) and the Postsecondary Education Quick Information System (PEQIS). The respondent universes and sample designs for FRSS and PEQIS that are covered by this generic clearance request are described below.

Fast Response Survey System

FRSS is designed to conduct brief surveys of state education agencies, public elementary and secondary schools, private elementary and secondary schools, public school districts, and school and public libraries. In the sections that follow, the approaches that will be used to design and select samples from the various sectors of interest are described. State education agencies are not discussed here, since they would be surveyed on a 100-percent basis without sampling.

Efficient probability sampling designs are an integral part of the FRSS. For those sectors that are surveyed frequently in FRSS (e.g., school districts and public schools), a general approach to sampling is designed and modified as necessary to meet the specific goals of the study. For example, for many FRSS surveys, probability-proportionate-to-size (PPS) sampling designs are used to ensure that both categorical and quantitative variables can be estimated reliably.

For some of the less frequently surveyed sectors, it is desirable to select a sample that is tailored to the specific needs of the individual survey. This specialization will be most efficient when pertinent data are available for sample selection purposes. Examples of situations that will necessitate designing and drawing special-purpose samples include surveys that are restricted to a particular subgroup (e.g., districts with summer migrant education programs, or less-than-2-year postsecondary institutions), surveys that require concurrent fielding of different questionnaires in the same sector (e.g., library services for children and young adults), and related surveys involving different sets of respondents that must

be linked through an overlapping sample design (e.g., the three surveys on educational technology being conducted in 2008-09).

Public Elementary and Secondary Schools

Since each new survey to be conducted under the FRSS will have unique analytic requirements, it is not possible to specify the exact form of the sample design that will be appropriate and efficient for a particular study. This can only be done after the study objectives have been clearly delineated. However, past experience suggests that many design features that have been employed successfully in prior studies will also be applicable to future FRSS studies.

First, the frame to be used to select the required samples will be constructed from the most recent NCES CCD Public School Universe File. As shown in Table 1, almost 86,000 regular public schools are included in the CCD file, including about 64,000 elementary schools and about 22,000 secondary/combined schools. The school-level variables that are available in the CCD Public School Universe File include enrollment, number of teachers, instructional level, grade span, type of locale, region, percentage of minority students, percentage of students eligible for free/reduced-price lunch, and others. Such information is critical for designing efficient samples for the QRIS. As in prior studies, it is anticipated that instructional level, enrollment size, and one or more other variables will be used to define the primary strata for sampling purposes. It should be noted, however, that it may be necessary to merge information from other data sources (e.g., the Schools and Staffing Survey - SASS) to obtain relevant auxiliary variables useful for stratification or weighting purposes. Also, some variables in the CCD file may have missing values (e.g., minority enrollment and the number of students eligible for free/reduced-price lunch). If used for stratification purposes, the missing values will have to be imputed or treated as a separate category.

Table 1.   Number of schools in the 2005-06 CCD Public School Universe file, by level and enrollment size class

Instructional level	Enrollment size class	Number of schools*
1. Elementary	Less than 300	16,335
	300 to 499	20,895
	500 to 599	8,731
	600 to 749	8,405

	750 or more	9,281
2. Secondary/combined	Less than 300	6,718
	300 to 499	3,622
	500 to 999	5,615
	1,000 to 1,499	2,842
	1,500 or more	3,275
TOTAL		85,719

* Counts reflect only regular schools in the CCD file. For example, special education, vocational education, and other alternative schools are excluded.

Next, decisions must be made on how to allocate the total sample to the primary strata. For example, proportional allocation (in which the sample is allocated to a stratum in proportion to the number of schools in the stratum) is generally efficient for estimating the percentage of schools having a given characteristic (e.g., percentage of schools that have computers for instructional purposes). On the other hand, allocation in proportion to enrollment is generally more effective for estimation of aggregate statistics that are correlated with enrollment (e.g., the number of secondary school students that have direct access to the Internet). Although many prior FRSS samples have been designed primarily to estimate the latter type of aggregate statistics, there has generally been an equal interest in estimating percentages. For this reason, allocation in proportion to the square root of enrollment offers a compromise solution that is often used in many QRIS surveys. Again, the specific requirements of a particular survey will dictate how the sample is allocated to strata.

Within the primary strata, schools can also be selected at varying rates depending on the goals of the study. This can be accomplished either by using a PPS systematic sampling algorithm (Hansen, Hurwitz, and Madow, 1953), or by forming appropriate size classes (strata) of equal aggregate measure of size and selecting equal numbers of schools from each size stratum. The latter procedure is often used for reasons of simplicity.

The sample size for a typical FRSS survey of public schools is approximately 1,200. This will yield a sample of 1,080 respondents assuming a response rate of 90 percent. For a sample of this size, the standard error of an estimated percentage for the total sample can be expected to be in the range of 1.3 to 1.6 percent. For a 50 percent item, a standard error of 2 percent corresponds to a coefficient of variation (cv) or relative standard error (RSE) of 4 percent. Moreover, the sample is large enough to provide reasonably reliable estimates for

broad subsets of the population (e.g., one-way classifications by type of locale or size class). Table 2 illustrates the levels of precision that can be expected for a sample of 1,080 responding public schools. The standard errors presented in this table are given for illustrative purposes only; the actual standard errors to be obtained for any given QRIS survey may be smaller or larger than those shown.

Table 2. Illustrative standard errors for an estimated percentage based on a sample of 1,080 public schools, by instructional level, Census region, type of locale, and size class

Subset of sample	Expected sample size*	Estimated percentage equal to:		
		80%	50%	30%
Total sample	1,080	1.3	1.6	1.5
Instructional level				
Elementary	648	1.7	2.1	2.0
Secondary/combined	432	2.1	2.6	2.4
Census region				
Northeast	186	3.1	3.8	3.6
Midwest	297	2.5	3.1	2.9
South	372	2.2	2.8	2.6
West	227	3.0	3.8	3.5
Type of locale				
Cities	252	2.8	3.5	3.2
Urban fringe	262	2.7	3.4	3.1
Towns	292	2.5	3.1	2.8
Rural areas	274	2.5	3.2	2.9
Enrollment size				
Small (less than 500)	356	2.1	2.7	2.4
Medium (500-999)	351	2.1	2.7	2.4
Large (1,000+)	373	2.1	2.6	2.4

* Assumes an initial sample of 1,200 schools and a response rate of 90 percent.

Private Elementary and Secondary Schools

The general approach described previously for public schools will also apply to private schools. Samples of private schools will be selected from the most current NCES Private School Survey (PSS) Universe File. Note that the PSS frame consists of two parts: a list frame and an "area frame." The latter is actually an area probability sample that represents schools not included in the list frame. Consequently, the schools in the area sample must be weighted to represent the unlisted portion of the private school universe. Table 3 summarizes the weighted distribution of private schools in the 2005-06 PSS frame by affiliation and instructional level. To select the sample of private schools, stratification by instructional level (elementary, secondary, and combined), type of affiliation (Catholic, other religious, and nonsectarian), and other characteristics may be employed. Within each primary stratum, the private school frame can be sorted by enrollment size, geographic region, or other characteristics available in the PSS file to induce additional implicit stratification. Depending on the goals of the survey, the total sample can be allocated to the primary strata in different ways (e.g., in proportion to the number of schools, in proportion to enrollment, or in proportion to

the aggregate square root of the enrollment). Table 4 illustrates the levels of precision that might be expected for a sample of 1,080 responding private schools (based on an initial sample of 1,200 schools and a response rate of 90 percent).

Table 3.   Number of schools in the 2005-06 PSS private school frame by affiliation and instructional level

| Type of affiliation | Total | Instructional level | | |
		Elementary	Secondary	Combined
Catholic	7,574	6,168	1,211	195
Other religious	14,001	7,296	982	5,723
Nonsectarian	5,813	4,151	728	934
Total	27,388	17,615	2,921	6,852

Table 4.   Illustrative standard errors for an estimated percentage based on a sample of 1,080 private schools, by instructional level and affiliation

| Subset of sample | Expected sample size* | Estimated percentage equal to: | | |
		80%	50%	30%
Total sample	1,080	1.4	1.7	1.6
Instructional level				
Elementary	527	1.9	2.4	2.2
Secondary	278	2.7	3.5	3.2
Combined	276	2.8	3.5	3.3
Affiliation				
Catholic	491	2.0	2.5	2.4
Other religious	407	2.2	2.8	2.6
Nonsectarian	183	3.3	4.1	3.8

* Assumes an initial sample of 1,200 schools and a response rate of 90 percent.

Public School Districts (LEAs)

The sampling frame to be used to select the required samples of public school districts (LEAs) will be constructed from the most recent NCES CCD Public Elementary and Secondary Agency Universe File. As shown in Table 5, over 14,000 regular public school districts are included in the 2005-06 CCD file. We anticipate that for most of the district surveys to be conducted under FRSS, stratification by size class, region, metropolitan status, poverty status, or other variables will be used to improve the precision of overall estimates, and to ensure minimum sample sizes for the analytic domains of interest. Further, we expect that a probability-proportionate-to-square-root-of-size design will be efficient for the goals of the study. However, this basic design will be modified as necessary to meet the particular objectives of a given study.

The sample size for a typical FRSS district survey is approximately 1,200 districts. Assuming a response rate of 90 percent, an initial sample of 1,200 districts will yield approximately 1,080 respondents. If the sample is allocated to strata in rough proportion to the aggregate square root of enrollment, the expected sample sizes would be those shown in Table 6. With these sample sizes, survey-based estimates for the total sample and for selected subgroups are expected to be reasonably precise. Table 6 illustrates the levels of precision to be expected for a sample of 1,080 public school districts

Table 5.   Distribution of public school districts in the 2005-06 NCES CCD LEA Universe Survey by enrollment size class and poverty status

Enrollment size class	Number of districts†	Percent of children below poverty level*			
		Missing	Under 10	10 to 19.9	20+
Less than 1,000	6,520	101	1,588	2,895	1,936
1,000 to 2,499	3,335	21	1,040	1,348	926
2,500 to 9,999	3,082	5	1,169	1,092	816
10,000 to 99,999	869	34	216	385	234
100,000+	26	0	6	12	8
TOTAL	13,832	161	4,019	5,732	3,920

*Based on Title 1 poverty measures provided by NCES.

†Includes district types 1 (local school district not part of a supervisory union) and 2 (local school district component of a supervisory union). Counts exclude districts with 0 or missing enrollment as reported in the CCD universe file.

Table 6.   Illustrative standard errors for an estimated percentage based on a sample of 1,080 public school districts, by size class, region, and metropolitan status

Subset of sample	Expected sample size*	Estimated percentage equal to:		
		80%	50%	30%
Total sample	1,080	1.5	2.0	1.8
District size class				
Less than 2,500	376	2.5	3.0	2.8
2,500 to 9,999	388	2.2	2.8	2.6
10,000 or more	315	2.5	3.1	2.8
Region				
Central	318	2.8	3.5	3.3
Northeast	210	3.5	4.3	4.0
Southeast	216	3.5	4.3	3.9
West	335	2.8	3.5	3.2
Metropolitan status				
Urban	211	3.0	3.8	3.5
Suburban	470	2.3	2.9	2.7
Rural	398	2.6	3.2	2.9

Libraries

As an important provider of educational services, libraries (both school and public libraries) have been the focus of past research efforts. For example, public libraries have been surveyed in FRSS 66 (survey on programs for adults in public library outlets) and FRSS 47 (survey on library services for children and young adults). In addition, Westat has conducted surveys of public and private school libraries for ED as part of the Assessment of the Role of School and Public Libraries in Support of the National Education Goals. If required for a QRIS survey, samples of public libraries will be drawn from the most recent NCES Public Library Survey (PLS) universe file. Westat is familiar with this file, having used it to design and select samples for previous surveys.

Postsecondary Education Quick Information System (PEQIS)

The samples of postsecondary institutions for PEQIS studies will usually use the existing postsecondary education panel. This panel currently consists of a stratified probability sample of more than 1,600 2- and 4-year public and private institutions. The sampling frame for the 2006 PEQIS panel was constructed from the 2005-06 Integrated Postsecondary Education Data System (IPEDS) Institutional Characteristics file. Institutions eligible for the 2006 PEQIS frame included 2-year and 4-year (including graduate-level) institutions that are both Title IV eligible and degree granting, and are located in the 50 states and the District of Columbia: a total of 4,265 institutions. The 2006 PEQIS sampling frame was stratified by instructional level (4-year, 2-year), control (public, private not-for-profit, private for-profit), highest level of offering (doctor's/first-professional, master's, bachelor's, less than bachelor's), and total enrollment. Within each of the strata, institutions were sorted by region (Northeast, Southeast, Central, West) and by whether the institution had a relatively high minority enrollment. The sample of 1,627 institutions was allocated to the strata in proportion to the aggregate square root of total enrollment. Institutions within a stratum were sampled with equal probabilities of selection. Table 7 summarizes the current PEQIS universe counts and sample sizes by level and type of control.

Table 7.   Distribution of institutions in the 2006 postsecondary (PEQIS) universe and panel

Level	Control	Number of institutions in 2006 PEQIS frame	Number in 2006 PEQIS panel
4-year	Public	640	433
	Private, nonprofit	1,534	470
	Private, for profit	408	69
2-year	Public	1,044	550
	Private, nonprofit	113	20
	Private, for profit	526	85
Total		4,265	1,627

Since 1991 when the PEQIS panel was originally selected, the panel has been updated or "reselected" three times at roughly 5 year intervals. Since it was desirable from an operational standpoint to retain as many of the existing institutional coordinators as possible, the panels were reselected using procedures designed to maximize the overlap between the resulting (new) sample and the previous sample. The method used for this was a "modified Keyfitz" procedure that maximizes sample overlap subject to the constraint that the desired overall probabilities of selection are consistent with those that would have been obtained with an independently selected sample. Using the modified Keyfitz procedure, the percentage overlap between successive PEQIS samples has been about 80 percent.

Each institution in the PEQIS panel is asked to identify a campus representative to serve as survey coordinator. The campus representative facilitates data collection by identifying the appropriate respondent for each survey and forwarding the questionnaire to that person.

Less-than-2-year and non-degree-granting institutions are not included in the PEQIS universe and panel because of the great volatility of these types of institutions. These schools, many of which are proprietary, open and close at a much faster rate than other kinds of postsecondary institutions. This means that any portion of the PEQIS panel allotted to less-than-2-year and non-degree-granting institutions would be outdated very quickly -- that is, it would no longer represent an up-to-date universe of these schools. Further, NCES does not anticipate that there will be many survey requests that include these institutions. Thus, NCES decided that when a survey was requested through PEQIS that included less-than-2-

year or non-degree-granting institutions, the most recent IPEDS Institutional Characteristics file would be used to draw an up-to-date supplementary sample of these institutions to be used for that survey. This approach means that the basic PEQIS panel will remain up-to-date (i.e., will accurately reflect the current universe of sampled institutions) for a longer period of time, and the supplementary samples of less-than-2-year and non-degree-granting institutions will also be up-to-date for the specific surveys for which these supplementary samples are drawn. NCES believes that this approach is the best compromise between the efficiencies of a standing panel of postsecondary institutions and the need for any such panel to reflect the current universe of institutions.

Nonresponse weight adjustments will be used to correct for unit nonresponse in surveys. Variances will be estimated using the jackknife replication method. Estimates produced during the PEQIS panel design stage, based on characteristics of the institutions, yielded coefficients of variation (CVs) in the range of 2 to 4 percent for most national estimates, with estimates for subgroups somewhat higher.

B.2. Statistical Methodology

The statistical methodology is described in detail in Section B.1.

B.3. Methods for Maximizing the Response Rate

Telephone followup for nonresponse will begin about 3 weeks after questionnaires have been mailed to the institutions. Experienced telephone interviewers will be trained in administering the questionnaire and will be monitored by Westat supervisory personnel during all interviewing hours. The response rate for the quick response surveys with single-stage samples completed to date through FRSS ranges from 85 to 99 percent, with most surveys above 90 percent, and on PEQIS ranges from 90 to 96 percent. Similar response rates are anticipated for future FRSS and PEQIS surveys. Ratio-weighting within adjustment cells will be used to partially compensate for the expected 10 percent (or less) nonresponse to each survey.

B.4.   Tests of Procedures and Methods

Following the procedures for NCES quick-response surveys (PEQIS and FRSS) established during the current QRIS generic clearance (1850-0733), a pretest with nine institutions is conducted prior to OMB review for each survey to determine what problems respondents might have in providing the requested information and to make appropriate changes to the questionnaire, if necessary. Responses and comments on the questionnaire are collected by fax and telephone during the pretest, and the results are summarized as part of the documentation for the survey.

B.5.   Reviewing Statisticians

Statistician Adam Chu of Westat (301-251-4326) was consulted about the statistical aspects of the PEQIS panel design. Adam Chu is also the statistician for FRSS samples.

QRIS surveys are sponsored by NCES. Westat is the contractor currently conducting the QRIS surveys for NCES. For each survey, Westat will mail the questionnaires; collect data by Web, mail, and telephone; edit, code, key, and verify the data; and produce tabulations and the survey report.