Technical Notes
Arts Education Surveys of Secondary School Teachers:
Survey of Secondary School Music Specialists

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Data perturbations were conducted on some background data to preclude identification of individuals and institutions.

Fast Response Survey System

The Fast Response Survey System (FRSS) was established in 1975 by the National Center for Education Statistics (NCES), U.S. Department of Education. FRSS is designed to collect issue-oriented data within a relatively short time frame. FRSS collects data from state education agencies, local education agencies, public and private elementary and secondary schools, public school teachers, and public libraries. To ensure minimal burden on respondents, the surveys are generally limited to three pages of questions, with a response burden of about 30 minutes per respondent. Sample sizes are relatively small (usually about 1,000 to 1,500 respondents per survey) so that data collection can be completed quickly. Data are weighted to produce national estimates of the sampled education sector. The sample size is large enough to permit limited breakouts by classification variables. However, as the number of categories within the classification variables increases, the sample size within categories decreases, which results in larger sampling errors for the breakouts by classification variables.

Sample and Response Rates

The nationally representative sample for the FRSS survey of secondary school music specialists consisted of 1,354 music teachers in regular public secondary schools in the 50 states and the District of Columbia. This secondary school teacher survey was part of a study consisting of seven surveys that were administered during the 2009–10 school year. At the elementary school level, the study included a survey of school principals and three teacher-level surveys, one each for self-contained classroom teachers, music specialists, and visual arts specialists. At the secondary school level, the study included a survey of school principals and two teacher-level surveys, one each for music specialists and visual arts specialists. NCES is releasing separate data files for each of the seven surveys.

The sampling frames for the school surveys and teacher list collections were based on regular public schools from the 2006–07 NCES Common Core of Data (CCD) Public School Universe file, which was the most current file available at the time of sample selection. The sampling frame included 85,962 regular public schools. Of these, 52,807 were elementary schools, 31,133 were secondary schools, and 2,022 were combined schools. The frame included regular public elementary and secondary schools[1] in the 50 states and the District of Columbia and excluded special education, vocational, home, adult education, private, and alternative/other schools; schools in the outlying U.S. territories; schools operated by the Department of Defense or Bureau of Indian Education; schools lacking any grade higher than kindergarten; and schools with only ungraded students. Charter schools were eligible for inclusion because they were classified as regular schools in the CCD.

Separate stratified samples of public elementary and secondary schools were selected to receive the appropriate survey instrument for the school-level surveys and teacher list collections. Combined schools were given a chance for selection for both surveys and, if selected, were asked to complete only the survey instrument for which they were selected. To select the sample, the sampling frame was stratified by instructional level. Elementary and secondary schools were also stratified by school enrollment size. To improve the representativeness of the sample, an implicit stratification was induced by sorting the schools within each stratum by geographic region; community type; percent combined enrollment of Black, Hispanic, Asian/Pacific Islander, or American Indian/Alaska Native students; and percent eligible for free or reduced-price lunch.

For the secondary teacher surveys, a sample of 1,602 schools was selected for the purpose of constructing teacher lists for the surveys of secondary school music and visual arts specialists. Within each stratum, the sample of schools was selected systematically and with probabilities proportionate to the square root of the estimated number of teachers in the school. A subsample of 1,202 schools was selected to respond to the principal survey and provide lists of full- or part-time music specialists and visual arts specialists. The remaining 400 secondary schools in the sample were asked to provide lists of music specialists and visual arts specialists only (i.e., they were not sampled to complete the school-level survey).

A total of 2,656 teachers were sampled from the eligible secondary school teacher lists: 1,354 music specialists and 1,302 visual arts specialists. On average, two teachers were sampled per secondary school. Exactly one teacher was randomly selected from each of the following groups: full- or part-time music specialists (if available at the school) and full- or part-time visual arts specialists (if available at the school).

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[1] Regular school is defined as a public elementary or secondary/combined school that does not focus primarily on vocational, special, or alternative education.

Survey and list collection materials were mailed to secondary school principals in September 2009. Included in the packages were forms for respondents to insert the names of their full- or part-time music specialists and visual arts specialists to provide sampling information for the secondary school teacher surveys. Telephone follow-up for those who did not respond to the initial list collection mailings was conducted from October 2009 through April 2010. Of the 1,602 secondary schools sampled to provide teacher lists, 41 were found to be ineligible for the study during the teacher list collection activity because they had closed, reconfigured, or did not include secondary grades. For the eligible secondary schools, the unweighted teacher list collection response rate was 94 percent (1,473 schools providing teacher lists divided by the 1,561 eligible schools in the sample). The weighted response rate for the secondary teacher list collection was 93 percent.

Questionnaires and cover letters were mailed to the sampled teachers in several batches from January through late April 2010. Teachers were mailed one of two types of questionnaires tailored to the teaching assignment (music or visual arts). Telephone follow-up for questionnaire nonresponse was conducted from February through July 2010. Of the 1,354 secondary music specialists sampled for the survey, 39 were ineligible because they did not primarily teach music or were not employed at the sampled school at the time of the study. For the eligible music specialists, the unweighted response rate was 81 percent (1,065 respondents divided by the 1,315 eligible music specialists in the sample). The weighted response rate was 82 percent. Of the secondary music specialists that completed the survey, 68 percent completed it by web, 28 percent completed it by mail, 4 percent completed it by fax, and less than 1 percent completed it by telephone.

Although item nonresponse for key items was low, missing data were imputed for the items with a response rate of less than 100 percent. The missing items included both numerical data such as the number of chorus sections or classes taught, as well as categorical data such as whether the teacher had a teaching certificate or license in music education. The missing data were imputed using a "hot-deck" approach to obtain a "donor" teacher from which the imputed values were derived. Under the hot-deck approach, a donor teacher that matched selected characteristics of the teacher with missing data (the recipient) was identified. The matching characteristics included characteristics of the school such as categories of school enrollment size; locale; categories for percent combined enrollment of Black, Hispanic, Asian/Pacific Islander, or American Indian/Alaska Native students; and categories for percent of students in the school eligible for free or reduced-price lunch. In addition, relevant questionnaire items were used to form appropriate imputation groupings. Once a donor was found, it was used to obtain the imputed values for the teacher with missing data. In general, the imputed value was simply the corresponding value from the appropriate donor teacher. For certain numerical items (e.g., number of classes taught or enrollment in classes), the imputed value was chosen from a donor that provided broadly similar responses relating to the size and workload of the classes taught to the extent feasible. Imputation flags are included in the data.

Nonresponse Bias Analysis

NCES statistical standards and guidelines require a nonresponse bias analysis if the unit response rate at any stage of data collection is less than 85 percent. For the teacher surveys, nonresponse occurred when an eligible sampled school did not provide a teacher sampling list or an eligible sampled teacher did not complete the questionnaire. For the secondary music teacher survey, the weighted list collection response rate was 92.9 percent, and the weighted survey response rate was 81.8 percent. Therefore, a nonresponse bias analysis was conducted for the survey. The analysis looked for potential nonresponse biases and examined whether any additional weighting adjustments for nonresponse beyond the usual FRSS procedures should be considered. Nonresponse weighting classes were formed using school- and

teacher-level variables with known values for both respondents and nonrespondents, and which were identified by the analysis as being correlated with response propensity.

The analysis included an examination of the impact of school-level nonresponse (i.e., schools that did not provide a teacher list for sampling) and the impact of teacher-level nonresponse within responding schools. For each type of nonresponse, an examination of response rates by school characteristics and a comparison of the base-weighted distributions of characteristics for the total sample versus the respondents were conducted. School characteristics where the response rates varied significantly for subgroups were identified. Next, comparisons were made of weighted data before and after the nonresponse adjustments were made to the weights. These comparisons involved weighted distributions of respondents by selected school characteristics, estimates of CCD data items, and estimates of selected survey results.

The analysis found that school response rates varied by locale; region; poverty status; the percent combined enrollment of Black, Hispanic, Asian/Pacific Islander, or American Indian/Alaska Native students; and school enrollment size. Teacher response rates only varied significantly by sampling batch, which is an indicator of how early or late in the data collection period the teacher sampling list was received. To compensate for the differential response rates, weight adjustments were used to derive adjusted teacher weights for analysis purposes. These adjustments were made in two stages. First, adjustments were made to the school component of the teacher weight to compensate for nonresponse during list collection. The nonresponse-adjusted school weights were used to compute the teacher weights, which were then adjusted for teacher nonresponse. In general, such weight adjustments will reduce nonresponse bias if the variables used in forming the weight adjustment classes are correlated with response propensity (the probability that a sampled school or teacher will respond to the survey) and with the characteristics obtained from the survey.

There are reasons to believe that the nonresponse-adjusted weights developed for this survey were reasonably effective in reducing potential biases. First, the school-level weight adjustments removed all of the significant differences between the weighted distributions of the responding schools and the corresponding distributions of the total school sample. For example, the mean absolute relative bias across all categories went from 3.6 percent before adjustment to 1.6 percent after adjustment. A comparison of weighted estimates of selected school-level characteristics available in the CCD files seems to corroborate this conclusion. Of the CCD items considered, the school-level weight adjustment procedures eliminated or reduced the differences in the weighted estimates between the responding schools and the corresponding total school sample.

Similarly, the second-stage nonresponse adjustment of the teacher weights appeared to be reasonably effective in reducing any residual differences between the distributions of the responding and nonresponding teachers. A comparison of weighted teacher estimates of selected survey items before and after nonresponse adjustment indicated that there generally were no significant differences between the nonresponse-adjusted estimates and the corresponding base-weighted estimates prior to adjustment. This suggests that much of the bias reduction was likely captured in the school-level nonresponse adjustments. The absence of statistically significant differences may also suggest that the correlation between the survey responses and the variables used in the weighting adjustment (which are expected to be among the most important predictors of response propensity) is sufficiently small that any adjustment methodology involving these variables will not have an appreciable impact on the weighted estimates.

Although it is possible to conduct more in-depth analysis and possibly refine the weighting procedures, the results of this analysis suggested that any potential improvements would be modest at best. Therefore, NCES determined that no additional analysis or adjustments to the weights was needed.

Weighting Procedures and Sampling Errors

The response data were weighted to produce national estimates (see table 1). The weights were designed to adjust for the variable probabilities of selection and differential nonresponse. FRSS survey data are based on complex sample designs that require the use of weights to compensate for variable probabilities of selection, differential response rates, and possible deficiencies in the sampling frame.

The reciprocal of the probability of selection, referred to as the "base weight," will produce unbiased (or consistent) estimates of population totals and ratios if there is no nonresponse in the survey. Since a stratified sample design was employed to select schools at the first stage of sampling, the school component of the base weight for the i-th school in stratum h was initially computed as $w_{hi}=1/P_{hi}$ where P_{hi} is the overall probability of selecting school i in stratum h. Because not all of the sampled schools provided usable teacher lists, the school base weight was adjusted for nonresponse within relevant subgroups of schools. This adjusted school weight then served as the school component of the initial teacher weight. In other words, an initial teacher weight for the j-th sampled teacher in school hi was computed as $w_{hij}^{init} = w_{hi}^{adj} /f_{hij}$, where w_{hi}^{adj} = the nonresponse-adjusted school weight for school hi and f_{hij} is the corresponding within-school teacher sampling rate. Finally, the initial teacher weights were adjusted for teacher-level nonresponse using procedures analogous to those used to adjust the school weights. An adjustment factor computed as the inverse of the weighted teacher response rate within selected weighting classes was used to inflate the initial weights of the responding teachers in relevant weighting classes to obtain the final nonresponse-adjusted teacher weight.

The survey findings are presented in the *First Look* report titled *A Snapshot of Arts Education in Public Elementary and Secondary Schools: 2009–10* (NCES 2011-078) and a more detailed report titled *Arts Education in Public Elementary and Secondary Schools: 1999–2000 and 2009–10* (NCES 2012-014). The reported findings are estimates based on the sample selected and, consequently, are subject to sampling variability. The standard error is a measure of the variability of an estimate 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 percent of secondary school music teachers that taught music full time is 93.0 percent and the standard error is 1.0 percent. The 95 percent confidence interval for the statistic extends from 93.0 – (1.0 x 1.96) to 93.0 + (1.0 x 1.96), or from 91.0 to 95.0 percent. The coefficient of variation ("c.v.," also referred to as the "relative standard error") of an estimate (y) is defined as c.v. = (s.e. / y) x 100%, where s.e. is the standard error of the estimate y.

Because the data from the survey were collected using a complex sampling design, the variances of the estimates from this survey (e.g., estimates of proportions) are typically different from what would be expected from data collected with a simple random sample. Not taking the complex sample design into account can lead to an underestimation of the standard errors associated with such estimates. Estimates of standard errors were computed using a technique known as jackknife replication. As with any replication method, jackknife replication involves constructing a number of subsamples (replicates) from the full sample and computing the statistic of interest for each replicate. The mean square error of the replicate estimates around the full sample estimate provides an estimate of the variance of the statistic. To construct the replications, 50 stratified subsamples of the full sample were created and then dropped one at a time to define 50 jackknife replicates. A computer program (WesVar) was used to calculate the estimates of standard errors using the JK1 option.

Table 1. Number and percentage distribution of responding public secondary school music teachers in the study sample, and estimated number and percentage distribution of teachers the sample represents, by school characteristics: School year 2009–10

School characteristic	Respondent sample (unweighted)		National estimate (weighted)	
	Number	Percent	Number	Percent
All public secondary school music teachers	1,065	100	61,430	100
Enrollment size				
Less than 500	277	26	17,210	28
500 to 999	379	36	22,790	37
1,000 or more	409	38	21,430	35
Community type				
City	227	21	13,520	22
Suburban	336	32	19,260	31
Town	171	16	10,370	17
Rural	331	31	18,290	30
Region				
Northeast	216	20	13,000	21
Southeast	266	25	12,100	20
Central	294	28	19,860	32
West	289	27	16,480	27
Percent combined enrollment of Black, Hispanic, Asian/Pacific Islander, or American Indian/Alaska Native students[1]				
Less than 6 percent	227	21	14,250	23
6 to 20 percent	280	26	16,810	27
21 to 49 percent	271	25	15,170	25
50 percent or more	287	27	15,210	25
Percent of students eligible for free or reduced-price lunch				
0 to 25 percent	340	32	20,940	34
26 to 50 percent	371	35	22,340	36
51 to 75 percent	240	23	12,560	20
76 percent or more	109	10	5,360	9

[1]Black includes African American and Hispanic includes Latino.
NOTE: Detail may not sum to totals because of rounding or non-ascertained data.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Survey of Secondary School Music Specialists," FRSS 103M, 2009–10.

Nonsampling Errors, Coding, and Editing

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

To minimize the potential for nonsampling error, the questionnaire was pretested with public secondary school teachers. During the design of the survey and the survey pretest, an effort was made to check for consistency of interpretation of questions and definitions and to eliminate ambiguous items. The questionnaire and instructions were extensively reviewed by content experts in the arts education community.

Editing of the questionnaire responses was conducted to check the data for accuracy and consistency. Cases with missing or inconsistent items were recontacted by telephone to resolve problems. A coding source file and editing specifications were used to produce the codebook. The codebook served as the main tool for coding, editing, and processing completed questionnaires. Coders used the codebook to identify cases requiring data retrieval or clarification and prepare cases for entry into the web application. The source file served as a data dictionary and included the data file layout, a description of each data item, a list of valid response codes or range formats with codes for nonresponse and inapplicable, and defined skip patterns.

Logics, ranges, and validation checks were prepared prior to data collection and included online edit checks, manual logic checks, and automated checks using SAS. Online checks were incorporated into the web application and manual edits were conducted to process cases received by mail, fax, or telephone. Steps were taken to ensure that the method of entering data from web and hardcopy questionnaires was the same, regardless of mode. For example, to enter survey data received by mail, fax, or telephone, the data processing staff accessed the survey website as "respondents" and "completed" the survey using the responses on the hardcopy survey. Subjecting all survey responses to the same set of built-in logics, ranges, and validation checks helps to ensure that data entry does not produce systematic differences in the survey data. In addition, all hardcopy data were subject to 100 percent verification using "doublekeying."

Definitions of Selected Analysis Variables

Many of the school characteristics, described below, may be related to each other. For example, school enrollment size and community type are related, with city schools typically being larger than rural schools. Other relationships between these analysis variables may exist.

Enrollment Size (SIZE)—This variable indicates the total number of students enrolled in the school based on data from the 2006–07 CCD Public School Universe file. The variable was collapsed into the three categories below.

Less than 500 students
500 to 999 students
1,000 or more students

Community Type (URBAN)—This variable indicates the type of community in which the school is located, as defined in the 2006–07 CCD Public School Universe file. These codes are based on the location of school buildings. This classification system is referred to as the "urban-centric" classification system to distinguish it from the previous "metro-centric" classification system. The urban-centric locale codes are assigned through a methodology developed by the U.S. Census Bureau's Population Division in 2005. This classification system has four major locale categories—city, suburban, town, and rural—each of which is subdivided into three subcategories. These 12 categories are based on several key concepts that Census uses to define an area's urbanicity: principal city, urbanized area, and urban cluster, as discussed below.

- A principal city is a city that contains the primary population and economic center of a metropolitan statistical area, which, in turn, is defined as one or more contiguous counties that have a "core" area with a large population nucleus and adjacent communities that are highly integrated economically or socially with the core.

- Urbanized areas and urban clusters are densely settled "cores" of Census-defined blocks with adjacent densely settled surrounding areas. Core areas with populations of 50,000 or more are designated as urbanized areas; those with populations between 25,000 and 50,000 are designated as urban clusters.

This variable was based on the 12-category urban-centric locale variable from CCD and collapsed into the four categories below.

City—Territory inside an urbanized area and inside a principal city
Suburban—Territory outside a principal city and inside an urbanized area
Town—Territory inside an urban cluster
Rural—Territory outside an urbanized area and outside an urban cluster

Geographic Region (OEREG)—This variable classifies schools into one of the four geographic regions used by the Bureau of Economic Analysis of the U.S. Department of Commerce. Data were obtained from the 2006–07 CCD Public School Universe file. The variable was collapsed into the four categories below.

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 Combined Enrollment of Black, Hispanic, Asian/Pacific Islander, or American Indian/Alaska Native students (MINST)—This variable indicates the percentage of students enrolled in the school whose race or ethnicity is classified as one of the categories below based on data in the 2006–07 CCD Public School Universe file.

- American Indian/Alaska Native is defined in CCD as a person having origins in any of the original peoples of North America and who maintains cultural identification through tribal affiliation or community recognition. American Indian includes Alaska Native.

- Asian/Pacific Islander is defined in CCD as a person having origins in any of the original peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands. This includes, for example, China, India, Japan, Korea, the Philippine Islands, and Samoa. Asian includes Native Hawaiian or other Pacific Islander.

- Black, non-Hispanic is defined in CCD as a person having origins in any of the black racial groups of Africa. Black includes African American.

- Hispanic is defined in CCD as a person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race. Hispanic includes Latino.

This variable was collapsed into the four categories below.

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

Percent of Students Eligible for Free or Reduced-Price Lunch (POVST)—This item serves as a measure of the concentration of poverty at the school. This variable is based on responses to question 27 on the secondary school questionnaire. If question 27 was not answered, this variable was obtained from the 2006–07 CCD Public School Universe file. This variable was collapsed into the four categories below.

25 percent or less
26 to 50 percent
51 to 75 percent
76 percent or more

School Level (LEVEL)—This variable classifies schools into levels based on the highest and lowest grades taught in the school. Data were obtained from the 2006–07 CCD Public School Universe file. The variable was collapsed into the two categories below.

Secondary school—If (a) the high grade was 7 or more and the low grade was 6 or more; or (b) the high grade was 7 or 8 and the low grade was 5.

Combined school—If the high grade was 9 or more and the low grade was 5 or less.

Definitions of Terms

The following is the exact wording of the definitions that were included on the questionnaire:

Arts instruction—The study of creative works in music, visual arts, dance, or drama/theatre, and the process of producing them.

Arts specialist—An education professional with a teaching certificate in an arts discipline, such as music, visual arts, dance, or drama/theatre, who provides separate instruction in that discipline.

Curriculum-based or co-curricular classes or sectionals held outside of regular school hours—School-sponsored music programs held outside of regular school hours. These classes must reflect school's **curriculum**. Students may be required to participate in the classes and they may receive partial credit for participation. These classes do **not** refer to extracurricular activities such as music clubs.

Block schedule—A type of academic scheduling in which each student has fewer classes per day for a longer period of time. Instead of traditional 40- to 50-minute periods, block scheduling allows for periods of an hour or more so that teachers can accomplish more in a session.

International Baccalaureate (IB)—Offers three programs of international education for students in a worldwide community of schools in 135 countries.

Types of teaching certificates/licenses:

- Regular or standard—State certificate/license or advanced professional certificate;

- Probationary—Certificate/license issued after satisfying all requirements except the completion of a probationary period; and

- Provisional, temporary, or emergency—Certificate/license that requires some additional coursework, student teaching, or passage of a test before regular certification can be obtained, and certificate issued to persons who must complete a certification program in order to continue teaching.

Virtual field trips—Using technology for students to view performances (e.g., concerts and musicals) without leaving the school.