Education and Certification Qualifications of Departmentalized Public High School-Level Teachers of Selected Subjects:

Evidence From the 2011–12 Schools and Staffing Survey

NCES 2015-814
U.S. DEPARTMENT OF EDUCATION

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Executive Summary

This report examines the postsecondary majors and teaching certifications of public high school-level teachers of departmentalized classes[1] in selected subject areas by using data from the 2011–12 Schools and Staffing Survey (SASS), a sample survey of elementary and secondary schools in the United States. SASS collects data on American public and private elementary and secondary schools and their related components (teachers, principals, libraries, and districts, where applicable).

Prior research in the field of education has examined the correlation between teacher education (postsecondary major) and certification and student outcomes (Ferguson 1991, 1998; Goldhaber and Brewer 1997, 1999, 2000; Mayer, Mullens, and Moore 2000; Sanders, Wright, and Horn 1997; Clotfelter, Ladd, and Vigdor 2010; Kane, Rockoff, and Staiger 2008). While this report does not link teacher qualifications to student outcomes, it contributes to the existing body of research by examining the extent to which teachers have in-field qualifications and the extent to which classes and students are being taught by teachers with in-field qualifications. Specifically, this report examines the qualifications of high school-level teachers of departmentalized classes in three ways. First, the report examines the percentages of public high school-level teachers who earned a degree in an in-field major,[2] held an in-field certification,[3] had both in-field qualifications, or had neither in-field qualifications. Second, the report looks at the percentages of grade 9−12 classes taught by teachers with one or both in-field qualifications. Finally, the report presents findings on the percentages of students in grades 9−12 who were taught by a teacher with one or both in-field qualifications.

At all three levels of analysis (teacher, class, and student), teachers' qualifications are considered in relation to the 11 following broad subject areas: English, mathematics,

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[1] High school-level teachers teach students in any of grades 10–12 (and may teacher lower grades as well) or grade 9 and no grade lower. Teachers of departmentalized classrooms instruct several classes of different students most or all of the day in one or more subjects. Departmentalized teachers are included because they represent a majority (87 percent) of teachers at the high school level and allow for analyses that tie specific teachers to specific classes and students.

[2] Teachers' main assignment was taken from question 16 of the SASS Teacher Questionnaire, which asks: "This school year, what is your MAIN teaching assignment field at THIS school? (Your main assignment is the field in which you teach the most classes)." "In-field major" means a teacher's main assignment is the same as the field in which the teacher has a bachelor's or above degree.

[3] "In-field certification" means a teacher is certified in his or her main assignment.

science, social science, French, German, Latin, Spanish, art/arts and crafts, music, and dance/drama or theater. Of these 11 broad subject areas, science and social science are analyzed with more granularity through 6 subfields of science and social science (biology/life sciences, physical science, economics, geography, government/civics, and history) and 3 further subfields of physical science (chemistry, earth sciences, and physics). Teachers of these subjects are considered in-field majors if they hold a bachelor's degree or higher in the subject(s) they taught. To be considered fully certified in the analysis, teachers need to hold a regular or standard state certification, an advanced professional certificate, or a certificate issued after satisfying all requirements except the completion of a probationary period. Certifications must apply to at least one of grades 9−12, except for the subjects of art/arts and crafts, music, and dance/drama or theater for which an ungraded certification (a certification that does not restrict a teacher to a specific grade range) is accepted.[4]

The teacher sample and analytical decisions in this report are motivated by current federal education legislation—that is, the Elementary and Secondary Education Act, or ESEA, of 1965 as amended in the 2001 No Child Left Behind Act (P.L. 107-110)—and state teaching certification requirements. ESEA only pertains to schools in the public sector. Although ESEA guides the structure of the analyses, this report is neither meant to report percentages of highly qualified teachers nor to be a commentary on any part of the law in general.

Estimates are produced from cross-tabulations of the data, and *t* tests are performed to test for differences between estimates. All differences cited in the text of this report are statistically significant at the $p < .05$ level. No corrections are made for multiple comparisons. As a result, an increase in Type I error is possible. Type I error is the observation of a statistical difference when, in fact, there is none. Readers are cautioned not to make causal inferences about the data presented here. Some of the major findings are presented below.

High School-Level Teacher Qualifications

- Of 11 broad subject fields analyzed in this report, the four most frequently reported main assignments in 2011–12 were English (152,400 teachers), mathematics (144,800), science (126,300), and social science (120,800) (table 1).

[4] An examination of state requirements revealed that in a majority of states, teachers of the arts were considered fully certified if they held an ungraded certification in the arts. In the analysis, teachers of dance and theater classes were also allowed reciprocation in the requirements for qualification (i.e., teachers were certified to teach dance classes if they held a theater certification and vice versa).

- Among the broad subject areas, more than half of teachers instructed all of their classes in their main assignment fields, except for German and dance/drama or theater (table 1).
- More than half of teachers of the 11 broad subject fields held both a postsecondary degree and a teaching certification in their respective main assignments, except for Latin and dance/drama or theater (table 2). For example, 69 percent of English teachers, 61 percent of mathematics teachers, 72 percent of science teachers, and 68 percent of social science teachers held both a postsecondary degree and a teaching certification.
- In the four subjects of English, mathematics, science, and social science, more than half of teachers who instructed all of their classes in their main assignments held both a postsecondary degree and certification in their respective main assignments (table 3). Specifically, of those who taught all classes in their main assignment, 71 percent of English teachers, 64 percent of mathematics teachers, 74 percent of science teachers, and 71 percent of social science teachers held both qualifications.
- More high school-level teachers reported a main assignment in the subject areas of English, mathematics, and science in 2011–12 than in 2003–04 (table 4). However, the percentages of teachers in 2011–12 with both an in-field major and in-field certification did not differ significantly from the percentage in 2003–04.

Qualifications of Teachers of Grade 9–12 Classes and Students

- More than half of grade 9–12 classes in most of the broad subject areas, except for German, Latin, and dance/drama or theater, were taught by teachers with both an in-field major and an in-field certification (table 5). By contrast, with the exception of biology/life sciences (62 percent), all subfield areas had less than 50 percent of classes taught by teachers with both qualifications.
- In the broad subject areas, more than half of students in grades 9–12 were taught by teachers with both an in-field major and an in-field certification in that subject area, except for German, Latin, and dance/drama or theater (table 6). However, with the exception of biology/life sciences (62 percent), all subfields had less than 40 percent of students taught by teachers with both qualifications.

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Introduction

This report uses data from the Schools and Staffing Survey (SASS), a sample survey of elementary and secondary schools in the United States sponsored by the National Center for Education Statistics (NCES) within the Institute of Education Sciences (IES) of the U.S. Department of Education. SASS has been conducted seven times beginning in the 1987−88 school year. When SASS was designed in the 1980s, the influential report titled *A Nation at Risk* cited that "half of the newly employed mathematics, science, and English teachers were not qualified to teach these subjects and that fewer than one-third of U.S. high schools offered physics taught by qualified teachers" (Smith 1995, p. 9). This led to the inclusion of a number of questions on the SASS teacher questionnaire that support the analysis of teaching assignments, degree majors, and subject matter certification and to the publication of nationally representative 1987−88 and 1990−91 data on teacher qualifications by NCES (Bobbitt and McMillen 1994; Smith 1995). Subsequently, findings on out-of-field teaching have been published using nationally representative data from SASS in 1993−94, 1999−2000, 2003−04, and 2007−08 (Ingersoll 1996; Seastrom et al. 2004; Morton et al. 2008; Hill 2011), with the most recent data, from 2011–12, presented in this report.

Although the policy emphasis has changed, concern with the impact of teacher quality on students' learning has persisted over the 24-year period between the first and the most recent administration of SASS. For example, the Elementary and Secondary Education Act (ESEA) as amended in 2001, included funds intended to "increase student academic achievement through strategies such as improving teacher and principal quality and increasing the number of highly qualified teachers in the classroom and highly qualified principals and assistant principals in schools" (No Child Left Behind Act, Public Law 107-110, Title II, Part A, Section 2101 (1)). In the current law, highly qualified teachers are defined as having a bachelor's degree; full state certification; and demonstrated competency, as defined by the state, in each core academic subject that they teach.

The authors used some aspects of ESEA to guide this report, including limiting the sample selection to public school teachers (traditional and charter) and examining subject fields that are defined as core academic subjects under ESEA. Although ESEA guided how the analyses were structured, this report is not meant to cite percentages of highly qualified teachers, nor to be a commentary on any part of the

law. Rather, this report contributes to the existing body of research examining the extent to which teachers have in-field qualifications and the extent to which classes and students are being taught by teachers with in-field qualifications (Holt, McGrath, and Seastrom 2006; McGrath, Holt, and Seastrom 2005; Seastrom et al. 2004; Hill 2011). Specifically, this report examines the postsecondary majors and teaching certifications of public high school-level teachers of departmentalized classes, which are defined in the SASS Teacher Questionnaire as those who typically instruct several classes of different students most or all of the day in one or more subjects. It provides data at the level of teachers, students, and classes, and addresses three main topics:

- the percentage of high school-level teachers who held an in-field postsecondary major, an in-field certification, both qualifications, or neither qualification—in a selection of main assignment fields, which is the subject in which they reported teaching the most classes;
- the percentage of grade 9–12 classes taught by a teacher with one, both, or neither in-field qualification—in a selection of course subject areas; and
- the percentage of grade 9–12 students taught by a teacher with one, both, or neither in-field qualification—in a selection of course subject areas.

A teacher's postsecondary education qualifications are measured by the correspondence between the major field of the teacher's degree and the subject(s) taught. Three criteria were used to determine teacher[1] certification status—the certification type, content area(s), and grade level(s). To be considered certified in a given field, the teacher must hold at least a regular[2] or probationary[3] certification recognized by the state in which the teacher is teaching, and the certification's content area(s) and grade level(s) must be consistent with what subject and grade levels are being taught. The analysis did not include academic minors. However, additional tables that examine teacher qualifications by school and teacher characteristics include academic minor. For more information, see *Supplemental Tables to NCES 2014-059* at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2014059.

To report on the match between a teacher's assignment and college major or certification subject, a typology of subject-matter specialties was developed based on the core subjects in ESEA and state teaching certification requirements (see *Measures:*

[1] The population of teachers analyzed in tables 1–4 includes departmentalized public school teachers of any of grades 10–12 (who may teach lower grades as well) or grade 9 and no grade lower in core subjects. Teacher-level is based on all of the grade levels that teachers reported teaching. Overall, this population represented 64 percent of the total public high school-level teacher population in 2011–12.
[2] This certification includes a regular or standard state certificate or advanced professional certificate.
[3] This certificate is issued after satisfying all requirements for a regular certificate except the completion of a probationary period.

Subjects Taught and Teacher Qualifications in the "Data and Measures" section of this report). Consequently, 11 broad subjects were chosen, and an additional 9 subfields were identified within science and social science.[4] For more information on matching criteria, see appendix D.

While each teacher reported teaching one main assignment in SASS, some teachers also taught classes outside their main assignments. To capture the qualifications of teachers in all classes taught, data are also presented using *classes* and *students*, rather than *teachers*, as units of analysis. The class- and student-level analyses shed light on the qualifications of teachers in relation to these "other" assignments. Analysis at three levels of measurement—teacher, class, and student—is also important to explore the prevalence of teachers' qualifications while considering variation in the number of classes they taught and the number of students in those classes.

The report opens with a discussion of teachers' *main assignments* and the percentage of classes that they taught in their main assignments (table 1). Next, the findings present the percentage of high school-level departmentalized teachers in public schools with varying combinations of majors and certifications in relation to their main assignments. Table 2 details the percentage of teachers who held an in-field major, held an in-field certification, had both in-field qualifications, or had neither in-field qualifications, within their main teaching assignments. Table 3 combines components from tables 1 and 2 to present three combinations of qualifications (both an in-field major and in-field certification, only an in-field major or only an in-field certification, and neither an in-field major nor an in-field certification) by the percentage of classes taught within teachers' main assignments. Table 4 shows three administrations of SASS to present the percentages of teachers in 2003−04, 2007−08, and 2011−12 who had both a major and certification in their main assignment, either a major or a certification in their main assignment, or neither qualification. More detail, and information about why similar comparisons to earlier administrations may not be feasible, can be found in appendix C.

Tables 5 and 6 shift the unit of analysis by presenting the percentage of grade 9–12 classes (table 5) and students (table 6) taught by departmentalized teachers with varying combinations of majors and certifications in relation to the course subject areas taught.[5]

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[4] Under science and social science, several subfields are examined in detail. However, these subfields are not inclusive of all subfields in science and social science because direct certification matches at the subfield level are difficult to obtain. Therefore, the subfields do not sum to the broad field totals.

[5] Tables 5 and 6 are based on teachers' reports of the grade level of the individual classes they teach. Classes and students included in these tables are in any of grades 9–12. Therefore, teachers in tables 5

SASS estimates are based on samples. The sample estimates may differ somewhat from the values that would be obtained from the universe of respondents. As a sample survey, SASS data are weighted to produce the population estimates provided in the tables. The standard errors for each estimate (provided in appendix A) are based on the amount of variation in the responses and the size of the sample or subgroup for which the estimate is computed. Differences cited in this report are statistically significant at the $p < .05$ level. No correction was made for multiple comparisons; as a result, an increase in Type I error is possible. Type I error is the observation of a statistical difference when, in fact, there is none. Readers are cautioned not to make causal inferences from the data presented here. For more information on the methodology used in this report, see appendix B.

and 6 may include teachers that are not high school-level teachers as defined in this report (i.e., teachers of grades 10–12 (who may teach lower grades as well) or grade 9).

Background

Much of the literature on teacher qualifications has examined the proportion of teachers who earn degrees and hold majors in and obtain certifications specific to the subjects they teach. This literature has largely focused on the relationship between the types of qualifications and the subjects and grade levels in which teachers provide instruction (Ingersoll 2007; Goldhaber and Brewer 2000; McGrath, Holt, and Seastrom 2005; Holt, McGrath, and Seastrom 2006). Further research has investigated the extent to which teacher qualifications and teaching assignments match student-level outcomes (Goldhaber and Brewer 1997, 1999, 2000). For example, some earlier research has linked improved student performance with instruction from teachers who earned a formal postsecondary degree or certification in the field of their assigned subject (Ferguson 1991; Goldhaber and Brewer 1997, 1999, 2000; Mayer, Mullens, and Moore 2000; Wenglinksy 2002). However, results have varied by subject, with more evidence of a correlation in mathematics and science than in other subjects (Goldhaber and Brewer 1997). Other research confirming the importance of teachers' characteristics—e.g., their training, experience, and qualifications—to student outcomes includes Darling-Hammond (2000); Goldhaber and Brewer (1999, 2000); Mayer, Mullens, and Moore (2000); Rivkin, Hanushek, and Kain (2005); and Sanders, Wright, and Horn (1997). Nonetheless, readers should be mindful of the difficultly of determining causal relationship between teacher training and student achievement, as there may be confounding variables associated with training that affect student outcomes.

More recent research on teacher quality has concentrated on teaching effectiveness or "value added" measures of teachers (Clotfelter, Ladd, and Vigdor 2010; Weisberg et al. 2009; Hanushek 2010; Bill & Melinda Gates Foundation 2013; Yoon et al. 2007; Chetty, Friedman, and Rockoff 2011). Some researchers have also focused on the intrinsic qualities of effective teachers and whether principals can detect which teacher candidates will be the most effective teachers (Kimball, Milanowski, and Heneman 2010; Staiger and Rockoff 2010). As a result of different conceptualizations, a variety of perspectives exist on the relationship between teacher preparation or certification and teacher effectiveness. For example, Kane, Rockoff, and Staiger (2008) indicated little or no differences in the effectiveness of certified, uncertified, and alternatively certified New York City teachers. Similarly, Constantine et al. (2009) found no overall differences in the effectiveness of certified and

alternatively certified teachers of reading and math. However, Clotfelter, Ladd, and Vigdor (2010) argued that, although teacher credentials do not explain all variation in teacher quality, they remain an important factor in predicting student achievement and are also integral policy levers.

While this report does not examine teachers' qualifications in relation to their students' levels of achievement, prior studies and different perspectives on teacher quality and qualifications provide background and support for the particular measures of teacher qualifications used here.

Postsecondary Majors

The research on teachers' majors has largely examined the relationship between majors and student test scores (Goldhaber and Brewer 1997, 1999, 2000). Goldhaber and Brewer (1997) found a significant positive relationship between teacher education and students' 10th-grade achievement in mathematics and science. Additionally, in examining data from the National Education Longitudinal Study of 1988 (NELS:88), Goldhaber and Brewer (1999, 2000) found that students whose teachers held both bachelor's and master's degrees in mathematics had an increase in 12th grade mathematics scores of "more than a third of a year of schooling" compared with students whose teachers did not hold the same credentials (Goldhaber and Brewer 1999, p. 94). However, Goldhaber and Brewer (1997, 1999, 2000) did not control for the level of classes that students took in the models; because higher-performing students could be taking higher-level math or science classes, these students may be more likely to have teachers with advanced skills and to have better test scores. Furthermore, while Goldhaber and Brewer's aforementioned study of 10th-grade test scores showed a positive relationship between teachers with a bachelor's degree in science and their students' test scores, their studies of 12th-grade test scores showed no relationship between teachers who held a degree in science, or who had taken postsecondary classes in science, and their students' test scores (Goldhaber and Brewer 1999, 2000).

Other researchers have also examined the relationship between postsecondary majors and student achievement, with varying results. For example, Wenglinsky (2002) found a positive relationship between student mathematics achievement and having an eighth grade teacher who had a major or minor in mathematics or mathematics education. However, a more recent study that examined a sample of teachers from the Teach for America and Teaching Fellows programs, as well as comparison teachers who were not from those programs, found no relationship

between having a teacher who majored in mathematics and student achievement in mathematics (Clark et al. 2013).

Certification

Literature supporting teacher certification requirements has contended that teaching is a profession that requires specialized skills and that certification ensures at least minimal standards in teacher quality (Goldhaber and Brewer 2000). However, there has been another side to the debate, one that has argued that certification is a barrier to entering the profession and notes the limitations of research on the positive benefits of teacher certification and educational outcomes (Walsh 2001). Generally, this research has focused on whether the teachers hold certifications, and for certified teachers, the certification types (e.g., regular, emergency, provisional, temporary, and probational)[6] and content areas included in the certification (e.g., mathematics, science).

Certification Content Area and Type

The body of research on teacher certification that examines the correlation between teacher certification and student outcomes typically has focused on the association between the certification *content area* and *type* (e.g., regular, probationary, emergency) and student test scores. Using the 12th-grade wave of the National Education Longitudinal Survey of 1988 (NELS:88), Goldhaber and Brewer (1999, 2000) found that students whose teachers held any certification in mathematics scored significantly higher on a 12th-grade mathematics achievement test than did students who were taught by teachers with no certification or a certification in another subject. Students who were taught by teachers with a mathematics certification recorded a 2-point increase on the NELS:88 mathematics test (equivalent to about three-quarters of a year of schooling). This was about twice the size of the association that Goldhaber and Brewer found among students whose teachers held a degree in mathematics. These authors also found similarly positive, but small and statistically nonsignificant, findings in science for students taught by a teacher certified in science.

[6] Typically, state education agencies award certification types other than regular certification to novice teachers, teachers who are still completing requirements for a full certification, or teachers who were given emergency credentials to teach.

Relevant Qualifications Beyond Major and Certification

Two NCES publications used the 1999–2000 SASS data to examine major and certification qualifications of teachers who teach students in grades 5–12 across two subfields: biology and history. McGrath, Holt, and Seastrom (2005) and Holt, McGrath, and Seastrom (2006) demonstrated that even teachers considered "out of field based on the presence or absence of a postsecondary major and state certification" may still have relevant training and education, such as minors or a major closely related to their main assignments.

Data and Measures

Data used in this report come from the 2003–04, 2007–08, and 2011–12 Schools and Staffing Survey (SASS) Restricted-Use Public School Teacher Data Files. The following section contains an explanation of the multiple levels of analysis, differing subpopulations, and the measures (subjects taught and teacher qualifications) utilized in this report. Additional detail about the SASS data and the measures used can be found in appendix B.

Levels of Analysis and Subpopulations: Teacher, Class, and Student

This report presents findings from multiple levels of analyses. The teacher-level analyses provide a description of the status of teachers' qualifications by subject area and relate directly to current federal education legislation. Teacher-level analyses in this report consider all degrees (bachelor's and above) and certifications (probationary and above) held by teachers and compare these qualifications with the subject of their main assignments.

The class- and student-level analyses are critical to exploring the qualifications of teachers who teach classes outside their main assignment, as well as variations in the number of classes and students taught by teachers with different qualifications. Separate class- and student-level analyses are important because not all teachers instruct the same number of classes and not all classes have the same number of students.

Although all tables present high school-level groups, important distinctions exist between the teacher subpopulation in the teacher-level tables and that in the class- and student-level tables. At the teacher level, the teacher subpopulation of analysis only includes teachers in departmentalized classrooms who instruct classes in any of grades 10–12 (and may teach lower grades as well) or grade 9 but no grade lower. At the class and student levels, the teacher subpopulation includes all departmentalized teachers who taught classes or students in grades 9–12 regardless of whether any lower grade is taught. More information on the concepts and measures used in the tables can be found in appendix B.

Subjects Taught: Main Assignment and Class Subject

For the purposes of the analyses presented here, teacher qualifications are considered as they relate to one of two measures of the subjects that teachers taught: *main assignment* and *class subject taught*. Each teacher self-reports one main assignment, defined in the SASS Teacher Questionnaire as the field in which he or she reported teaching the most (i.e., highest number of) classes. Teaching the greatest number of classes does not necessarily mean teaching more than 50 percent of a teacher's classes, as many teachers teach across more than 2 subject areas. The class subject area measure includes all subjects (or fields) taught by a teacher.

This report examines a selection of 20 main assignment fields and class subject areas, including some subfields of general (i.e., broad) subjects. More information on the subject areas that are excluded can be found in appendix B. The broad subject areas include the following: English, mathematics, science, social science, French, German, Latin, Spanish, art/arts and crafts, music, and dance/drama or theater. Within these broad subject areas, analyses of subfields are presented in the tables. The broad subject area of science includes the subfield areas of biology/life sciences and physical science. The subfield of physical science includes further subfields of chemistry, earth sciences, and physics. The broad subject area of social science includes the subfields of economics, geography, government/civics, and history. These 11 broad subject areas and 9 subfield areas represent academic subjects for which clear matches exist between teacher assignment and teacher qualifications and for which there are a sufficient number of sampled teachers to support accurate estimates. The reported broad areas and subfields are generally the certification fields and the core subjects in ESEA. No subfields of English and mathematics and not all subfields of science and social science are reported due to a lack of comparability of possible subfields for certification purposes. Additional information on the matching of the subject areas and subfield areas can be found in appendix D.

Teacher Qualifications: Major and Certification

This report addresses two primary measures of teacher qualifications—*teacher education* and *teaching certification*—as they relate to the main assignment and course subject area(s) taught. The definition of "in-field" qualifications included in this report is aligned with the ESEA definition of highly qualified teachers and is consistent with the definition used in recent NCES publications using SASS data, specifically Morton et al. 2008 and Hill 2011. However, the definition is different from that used in earlier publications using data from the 1999–2000 SASS (e.g., Seastrom et al. 2004). Due to differences in the analyses and changes in survey questions, readers are

strongly cautioned against making comparisons of estimates in this report and previously published reports that used data from 1999–2000 or earlier SASS administrations. More information about comparisons across time can be found in appendix C.

The analyses include teachers of all academic backgrounds. No distinction is made between degrees awarded within or outside a department, college, or school of education (i.e., degrees from both education and subject-specific departments are included). The major field of study measure was produced using the educational background items in the SASS Teacher Questionnaire. Teacher education was categorized using two components of teachers' academic majors: the level at which the postsecondary degree was earned and the major field of study. The measure considered a teacher to have an in-field major if he or she either held at least a bachelor's degree in a major corresponding to the subject of the main assignment (tables 1–4) or held a degree corresponding to the subject of the class areas (tables 5 and 6).

Teacher certification status was based on three criteria—certification type, content area(s), and grade level(s). The SASS Teacher Questionnaire allows the respondent to report a first and second certification, if applicable, and both are considered in the analyses. To satisfy the analytical requirements of the teacher certification measure, a teacher must have reported a regular or standard state certification, an advanced professional certificate, or a certificate issued after satisfying all certification requirements except the completion of a probationary period. In addition, the certification must have been granted by, or recognized in, the state in which the teacher currently teaches. Further, given this report's focus on high school-level teachers, all certificates must apply to at least one of grades 9−12.

Matching Subject Taught and Teacher Qualifications

Teachers may not only teach more than one subject but also may have earned more than one postsecondary degree and more than one certification. The analyses in this report consider a teacher to have an in-field major or in-field certification if the major or certification held matches the subjects taught. Therefore, matches need to be made between the subjects that teachers taught and all the various majors and certifications that teachers held to determine which majors and certifications would be considered "in field". For example, in this analysis, a mathematics teacher is considered to hold a mathematics major if he or she reported any of the following majors: mathematics, computer science, engineering, or physics. See appendix D and exhibit D-1 for

information on how the matches between subjects taught and teacher qualifications were determined.

Findings

Presented below are findings from the teacher qualifications analyses using the 2011–12 Schools and Staffing Survey (SASS) Restricted-Use Public School Teacher Data File. When referring to teacher-level findings (tables 1–4), the term "teacher" denotes a traditional public or public charter school teacher of departmentalized classes who instructs students in *any of grades 10–12 (and may teach lower grades as well) or grade 9 but no grade lower*. In contrast, when referencing class- and student-level findings (tables 5 and 6), the term "teacher" describes a traditional public or public charter school teacher of a departmentalized class *containing students in any of grades 9−12*.

At all levels of analysis, the term "major" refers to any of the 79 possible fields of study listed on the teacher survey. While the survey asks for the major field of study for all levels of postsecondary education from a vocational certificate to a doctorate or first professional degree, this report considers a major *in-field* when held at the bachelor's degree level or higher and when taught to a class of the same subject. The term "certification" refers to a *regular or standard state certification, advanced professional certificate, or a certificate issued after satisfying all requirements except the completion of a probationary period*. For teachers to be categorized as "certified" in this report, certifications must apply to at least one of grades 9−12, except for the subjects of art/arts and crafts, music, and dance/drama or theater, for which an ungraded certification is included.[7] Teachers can report up to two in-state certifications with up to 10 potential content areas and grade ranges.

With the exception of table 1, results are compared and described based on whether or not teachers had in-field majors, certifications, a combination of both, or neither. These percentages provide an overall picture of the teacher qualification status and information regarding the variation between broad field and subfield areas. In the teacher-level analyses, teachers may be counted more than once (e.g., counted in the row for a broad field and for a subfield main assignment). For the broad fields, teachers were included if they reported teaching in their main assignments in the specific broad fields *or* any corresponding subfield areas. However, at the subfield level, teachers were included only if they reported a main assignment of any science or social science subfields *and* taught courses within the same respective subfields.

[7] An examination of state requirements revealed that in a majority of states, teachers of the arts were considered fully certified if they held an ungraded certification in the arts. In the analysis, teachers of dance and theater classes were also allowed reciprocation in the requirements for qualification (i.e., teachers were certified to teach dance classes if they held a theater certification and vice versa).

Readers are cautioned not to make causal inferences from the data presented here and, when making comparison across time, to be aware of changes across SASS administrations. SASS estimates are based on samples. The sample estimates may differ somewhat from the values that would be obtained from the universe of respondents. As a sample survey, SASS data are weighted to produce the population estimates provided in the tables. The standard errors for each estimate (provided in appendix A) are based on the amount of variation in the responses and the size of the sample or subgroup for which the estimate is computed. The tables present cross-tabulation estimates, between which two-tailed *t test*s were used to compare differences for statistical significance. All differences cited in this report are statistically significant at the $p < .05$ level. No corrections were made for multiple comparisons. As a result, an increase in Type I error is possible. Type I error is the observation of a statistical difference when, in fact, there is none. In addition, readers are cautioned against making direct comparisons between estimates in this report and previously published estimates that use SASS data from the 1999–2000 and prior administrations. Several changes were implemented in the 2003−04 SASS Teacher Questionnaire and carried over into the 2007−08 and 2011−12 SASS. All changes are documented in appendix C.

Teacher-Level Findings: Selected Main Assignments

In the SASS Teacher Questionnaire, teachers were asked to report their main teaching assignment—that is, the field in which they taught the most classes. As stated earlier, teachers may have taught additional classes outside the reported main assignments. This section examines the percentage of classes that teachers taught in their main assignments (table 1), as well as the percentage of teachers who held various combinations of qualifications (major and/or certification) in relation to their main assignments (table 2). Table 3 combines information from tables 1 and 2 to examine the qualifications of teachers in four selected main assignments by the percentage of classes they taught in their main assignment areas. Table 4 presents three administrations of SASS to display the percentages of teachers in 2003−04, 2007−08, and 2011−12 who had both a major and certification in their main assignment, either a major or a certification in their main assignment, or neither qualification.

Subjects Taught in Main Assignment

As shown in table 1, the four most frequently reported main assignments for public high school-level teachers who taught in departmentalized classes in 2011–12 were

English (152,400 teachers), mathematics (144,800), science (126,300), and social science (120,800). Among the selected subjects of foreign languages, 11,900 teachers reported a main assignment in French, 3,300 in German, 1,400 in Latin, and 50,500 in Spanish. In the selected arts, 33,400 teachers reported a main assignment in art/arts and crafts, 38,500 in music, and 10,000 in dance/drama or theater.

Table 1.
Number of public high school-level teachers who reported a particular main assignment and the percentage of teachers who taught various percentages of classes within that main assignment, by subject of main assignment: 2011–12

Selected main assignment	Number of teachers	Among teachers of a particular main assignment, the percentage who teach: 0 to 49.9 percent of their classes in their main assignment	50 to 99.9 percent of their classes in their main assignment	100 percent of their classes in their main assignment
English	152,400	2.1	17.8	80.1
Mathematics	144,800	1.5	11.4	87.1
Science	126,300	1.2!	14.3	84.5
Biology/life sciences	51,900	11.5	31.6	56.9
Physical science	64,600	3.3	30.0	66.7
Chemistry	24,200	10.1	39.0	50.9
Earth sciences	12,400	13.6!	22.2	64.3
Physics	13,300	8.0	50.3	41.8
Social science	120,800	2.4	16.1	81.5
Economics	8,900	21.1!	41.7	37.2
Geography	7,300	25.7!	42.2	32.2
Government/civics	15,600	16.8	48.1	35.1
History	60,300	9.8	40.6	49.6
French	11,900	‡	15.8	82.5
German	3,300	#	33.3!	66.7
Latin	1,400	#	‡	85.6
Spanish	50,500	‡	9.2	89.8
Art/arts and crafts	33,400	1.5!	13.7	84.8
Music	38,500	‡	10.6	88.4
Dance/drama or theater	10,000	‡	31.2	67.5

Rounds to zero.
! Interpret data with caution. The standard error for this estimate is between 30 percent and 50 percent of the estimate's value.
‡ Reporting standards not met. The standard error for this estimate is 50 percent more of the estimate's value.
NOTE: Teachers include traditional public school and public charter school teachers who taught departmentalized classes to students in any of grades 10–12 or grade 9 and no grade lower. The denominator used (all classes taught) is the sum of all subjects reported by the teacher, not the sum of classes taught within the selected 20 subjects. Each broad main assignment includes several subfields. Under science and social science, several subfields are examined in detail. These subfields are more narrowly defined and are not inclusive of all subfields in the subject and, therefore, do not add to the less narrowly defined broad field total. See appendixes for technical notes and definitions of specific subjects within main assignment fields. Detail may not sum to totals because of rounding and because some data are not shown. Not all apparent differences are significant.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.

While some teachers may have taught additional classes in subjects outside their main assignments, many teachers taught classes only in their main assignment fields. For example, of approximately 152,400 teachers with a main assignment in English, about 80 percent taught all of their classes in English, while an additional 18 percent taught most but not all (50 to 99.9 percent) of their classes in English and only 2 percent taught less than half of their classes in English. In all broad subject areas with the exception of German and dance/drama or theater, more than half of teachers instructed all classes in their main assignment fields. In fact, more than 75 percent of English, mathematics, and science teachers instruct all their classes in their

main assignment. These findings are not unexpected because the SASS Teacher Questionnaire defines main assignment as the subject in which the teacher instructs the most classes and asks teachers to report their main assignment with that definition in mind.

Nonetheless, across the science and social science subfields shown in table 1, there were only three of nine subfields (i.e., biology/life sciences, physical science, and earth science) in which more than half of the teachers instructed all classes in their main teaching assignment. Compared with the broad fields for science and social science, the percentages of teachers instructing in subfields corresponding with their main assignments were lower, due to narrower definitions of the subfield (see appendix D). For the broad fields, teachers were credited as being in-field if they reported teaching in their main assignments in the specific broad fields *or* any corresponding subfield areas. However, at the subfield level, teachers were credited as being in-field only if they reported a main assignment of any science or social science subfield *and* instructed courses within the same respective subfield.

For an example of this subfield versus broad field relationship, consider a hypothetical female teacher with a main assignment of biology/life sciences who taught two biology/life sciences classes, two science (general) classes, and one geometry class. With these classes, the teacher would appear in both the science row and the biology/life sciences row of table 1. In science, she would fall under the 50 to 99.9 percent column, because four of her five classes are contained under the broader umbrella of science. However, for biology/life sciences, she would appear in the 0 to 49.9 percent column because only two of her five classes are specifically in biology/life sciences. This teacher appears in both the general and specific subject rows, but her classes appear better matched to her main assignment in the general row due to broader matching criteria.

Teacher Qualifications by Main Assignment

The following section presents the percentage distribution of teachers with a major in the main assignment (regardless of certification status), certification in the main assignment (regardless of major status), both major and certification in the main assignment, and neither major nor certification in the main assignment.

Major in main assignment

The second data column in table 2 shows that the more than half of teachers in each of the broad subject fields held a major in the respective main assignments, except in Latin. Further, more than three-quarters of teachers of English (79 percent), science (80 percent), and social science (79 percent) held a major in their main assignments. About 70 percent of teachers with a main assignment of mathematics held a major in mathematics. Compared with the broad fields, a lower percentage of teachers held a major in the corresponding subfields of science, except biology/life sciences, and in all social science subfields, which are more narrowly defined than the broad fields.

Certification in main assignment

As shown in the last column of table 2, with the exception of dance/drama or theater, more than half of teachers in each of the broad subject fields held a certification in their main assignments.[8] In fact, more than three-quarters of teachers in English, mathematics, science, and social science held a certification in their main assignments, as shown in the last data column. In biology/life sciences, physical science, and chemistry, more than half of teachers held a certification in their respective main assignments. In contrast, in all subfields of social science, less than 50 percent of teachers held certifications in those specific main assignments.

[8] Despite the large apparent difference, the estimate for dance/drama or theater is not statistically different from 50 percent, possibly due to small cell sizes and large standard errors.

Table 2.
Number of public high school-level teachers who reported a particular main assignment and the percentage with a major and certification in that main assignment, by subject of main assignment: 2011–12

Selected main assignment	Number of teachers	Percent with a major in main assignment			Percent with no major in main assignment			Total certified
		Total	Certified	Not certified	Total	Certified	Not certified	
English	152,400	79.4	69.4	9.9	20.6	12.7	8.0	82.1
Mathematics	144,800	70.1	61.5	8.7	29.9	19.4	10.4	80.9
Science	126,300	79.7	72.3	7.3	20.3	13.4	7.0	85.7
Biology/life sciences	51,900	74.4	64.7	9.7	25.6	15.3	10.3	80.0
Physical science	64,600	46.0	38.0	8.0	54.0	29.5	24.5	67.4
Chemistry	24,200	45.9	34.2	11.8	54.1	35.6	18.4	69.8
Earth sciences	12,400	37.9	31.8	‡	62.1	30.8	31.3	62.5
Physics	13,300	50.4	36.7	13.7!	49.6	24.1	25.5	60.8
Social science	120,800	78.9	67.5	11.4	21.1	15.4	5.7	82.9
Economics	8,900	‡	‡	‡	89.1	18.0!	71.1	21.7!
Geography	7,300	‡	‡	‡	98.8	11.0!	87.9	11.9!
Government/civics	15,600	6.8!	‡	5.2!	93.2	19.8	73.4	21.4!
History	60,300	54.8	26.0	28.8	45.2	10.9	34.4	36.9
French	11,900	80.1	71.1	9.1	19.9	10.8	9.0!	81.9
German	3,300	85.9	73.3	‡	14.1!	‡	‡	83.7
Latin	1,400	54.4!	48.8!	‡	45.6!	43.9!	‡	92.8
Spanish	50,500	73.7	63.3	10.4	26.3	20.7	5.6	84.0
Art/arts and crafts	33,400	81.9	72.3	9.6!	18.1	10.2	7.9	82.5
Music	38,500	93.4	87.3	6.1	6.6	4.5!	2.2!	91.8
Dance/drama or theater	10,000	73.1	52.2	‡	26.9!	19.2!	7.7!	71.5

! Interpret data with caution. The standard error for this estimate is between 30 percent and 50 percent of the estimate's value.
‡ Reporting standards not met. The standard error for this estimate is 50 percent more of the estimate's value.

NOTE: Teachers include traditional public school and public charter school teachers who taught departmentalized classes to students in any of grades 10–12 or grade 9 and no grade lower. Each main assignment includes several subfields. Under science and social science, several subfields are examined in detail. These subfields are not inclusive of all subfields in the subject and, therefore, do not add to the broad field total. Majors are included regardless of whether they were held within or outside the school/college of education. Majors in main assignment are credited if they were held at the bachelor's degree level or higher. A certification is credited if it is a regular or standard state certificate or a probationary in-subject certification and at the secondary level. Detail may not sum to totals because of rounding and because some data are not shown. Not all apparent differences are significant.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.

Major and certification in main assignment

Examining broad subject fields in the third column of table 2, most teachers with a major in their main assignment also held a certification in their main assignment. Except for Latin and dance/drama or theater, more than half of teachers of the broad subject fields held both a major and certification. As for the more narrowly defined subfields, less than half of teachers in the subfields, except for biology/life sciences, held both qualifications.

Neither major and certification in main assignment

Examining the penultimate column of table 2, except for French, art/arts and crafts, and dance/drama or theater, less than 11 percent of teachers of broad subject fields held neither a major nor a certification in their main assignment.

However, the subfields of science and social science differed from broad subjects. Less than half of teachers in science subfields held neither in-field qualification. Conversely, with the exception of history (34 percent), more than half of teachers of social science subfields held neither qualification.

Teacher Qualifications by Main Assignment and Percentage of Classes Taught in Main Assignment

Elements presented in tables 1 and 2 are combined in table 3 to analyze the correspondence of main teaching assignment and varying combinations of teaching qualifications. Table 3 shows the percentage of teachers with both majors and certifications (second data column), only a major or certification (third data column), and neither a major nor a certification (fourth data column) by the percentage of classes they taught in their main assignments. To avoid unstable estimates due to small cell sizes, only the four main assignment areas with the largest numbers of teachers are included in this table: English, mathematics, science, and social science.

The findings indicate that across all four subject areas, more than half of teachers who instructed all their classes in their main assignments held both majors and certifications in their respective main assignments. For teachers with a main assignment in mathematics and social science, the percentage with both qualifications is highest among those with 100 percent of their classes taught in their main assignment field.[9] Nonetheless, approximately one-quarter of the teachers who taught all (100 percent) of their classes in the selected subjects held only one credential. Except for mathematics, less than 10 percent of those teachers with 100 percent of classes taught in their main assignment had neither qualification.

Major and certification in main assignment

For English, 71 percent of teachers who instructed all of their classes in English held both majors and certifications in English. Although not statistically significantly

[9] Despite the large apparent difference, the estimate of teachers with 0 to 49.9 percent of their classes in English (40 percent) was not significantly different from the estimate of teachers with 100 percent of their classes in English (71 percent), possibly due to small cell sizes and large standard errors.

different from those teaching all of their classes in the area of English, 67 percent of those who taught 50 to 99.9 percent of their classes in English, and 40 percent of those who taught 0 to 49.9 percent of their classes in English, held both in-field qualifications.

Table 3.
Number of public high school-level teachers who reported a particular main assignment and the percentage of teachers with various qualifications who taught various percentages of classes within that main assignment, by subject of main assignment: 2011–12

Selected main assignment	Number of teachers	Percent with a major and a certification in their main assignment	Percent with only a major or only a certification in their main assignment	Percent with neither a major nor a certification in their main assignment
English	152,400	69.4	22.6	8.0
Percentage of classes taught in English				
0 to 49.9	3,100	40.2!	34.8!	25.1!
50 to 99.9	27,200	66.9	21.8	11.2
100	122,100	70.7	22.5	6.8
Mathematics	144,800	61.5	28.1	10.4
Percentage of classes taught in mathematics				
0 to 49.9	2,200	25.6!	‡	58.5
50 to 99.9	16,400	50.5	31.8	17.7
100	126,200	63.5	27.8	8.7
Science	126,300	72.3	20.7	7.0
Percentage of classes taught in science				
0 to 49.9	1,500	55.9	‡	31.6!
50 to 99.9	18,100	63.2	24.3	12.5
100	106,700	74.1	20.2	5.7
Social science	120,800	67.5	26.8	5.7
Percentage of classes taught in social science				
0 to 49.9	3,000	47.6	32.4!	20.0!
50 to 99.9	19,400	52.0	35.2	12.8
100	98,400	71.2	24.9	3.9

! Interpret data with caution. The standard error for this estimate is between 30 percent and 50 percent of the estimate's value.

‡ Reporting standards not met. The standard error for this estimate is 50 percent more of the estimate's value.

NOTE: Teachers include traditional public school and public charter school teachers who taught departmentalized classes to students in any of grades 10–12 or grade 9 and no grade lower. Majors are included regardless of whether they were held within or outside the school/college of education. Majors in main assignment are credited if they were held at the bachelor's degree level or higher. A certification is credited if it is a regular or standard state certificate or a probationary in-subject certification and at the secondary level. Detail may not sum to totals because of rounding and because some data are not shown. Not all apparent differences are significant.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public Teacher Data File," 2011–12.

However, a higher percentage of teachers who instructed all of their classes in mathematics held both in-field qualifications than did their counterparts who taught classes outside mathematics. Approximately 64 percent of teachers who taught all classes in mathematics held a major and a certification in mathematics, compared to 51 percent of those who taught 50 to 99.9 percent of their classes in mathematics and 26 percent of those who taught less than half of their classes in mathematics.

A higher percentage of science teachers who instructed 100 percent of their classes in their main assignments held both qualifications (74 percent) than did those instructing 50 to 99.9 percent of their classes in science (63 percent). All additional tests for differences between science teachers' percentage of instruction in the main assignment were not statistically significant.

Similar to mathematics, a higher percentage of teachers who taught all of their classes in social science (71 percent) had both qualifications compared with those who taught 50 to 99.9 percent of their classes in social science (52 percent) and those who taught 0 to 49.9 percent of their classes in social science (48 percent).

Neither major nor certification in main assignment

Of the four subjects presented in table 3, about 9 percent or less of the teachers of English, science, and social science who taught all classes in their main assignments had neither an in-field major nor a certification. Specifically, 9 percent of mathematics teachers, 7 percent of English teachers, 6 percent of science teachers, and 4 percent of social science teachers taught all classes in their main assignment without an in-field major or certification.

Teacher Qualifications by Main Assignment Over Time

While tables 1 through 3 present the correspondence of main teaching assignment and varying combinations of teacher qualifications in 2011–12, table 4 shows the percentage of teachers with both a major and certification in their main assignment, only a major or a certification, and neither a major nor a certification across three administrations of SASS (i.e., 2003–04, 2007–08, and 2011–12). While readers are cautioned against making comparisons with 1999–2000 and prior administrations of SASS, more recent administrations of the survey have questionnaires with similar items that enable trend comparisons. More information about comparisons over time can be found in appendix C.

Table 4.
Number of public high school-level teachers who reported a main assignment and the percentage with various qualifications in that main assignment, by subject of main assignment: 2003–04, 2007–08, and 2011–12

Selected main assignment	Number of teachers			Percent with a major and a certification in their main assignment			Percent with only a major or only a certification in their main assignment			Percent with neither a major nor a certification in their main assignment		
	2003–04	2007–08	2011–12	2003–04	2007–08	2011–12	2003–04	2007–08	2011–12	2003–04	2007–08	2011–12
English	134,900	161,300	152,400	71.1	71.4	69.4	22.5	21.3	22.6	6.4	7.3	8.0
Mathematics	128,500	143,600	144,800	64.5	63.1	61.5	24.2	25.8	28.1	11.3	11.1	10.4
Science	106,100	119,800	126,300	71.7	73.6	72.3	23.8	22.4	20.7	4.5	4.0	7.0
Social science	111,600	119,200	120,800	70.7	73.6	67.5	24.1	20.6	26.8	5.2	5.8	5.7

NOTE: Teachers include traditional public school and public charter school teachers who taught departmentalized classes to students in any of grades 10–12 or grade 9 and no grade lower. Majors are included regardless of whether they were held within or outside the school/college of education. Majors in main assignment are credited if they were held at the bachelor's degree level or higher. A certification is credited if it is a regular or standard state certificate or a probationary in-subject certification and at the secondary level. Detail may not sum to totals because of rounding and because some data are not shown. Not all apparent differences are significant.
SOURCE: Morton, B.A., Hurwitz, M.D., Strizek, G.A., Peltola, P., and Orlofsky, G.F. (2008). *Education and Certification Qualifications of Departmentalized Public High School-Level Teachers of Core Subjects: Evidence From the 2003–04 Schools and Staffing Survey* (NCES 2008-338). U.S. Department of Education. Washington, DC: National Center for Education Statistics, Institute of Education Sciences; Hill, J.G. (2011). *Education and Certification Qualifications of Departmentalized Public High School-Level Teachers of Core Subjects: Evidence From the 2007-08 Schools and Staffing Survey* (NCES 2011-317). U.S. Department of Education, National Center for Education Statistics. Retrieved January 16, 2014 from http://nces.ed.gov/pubsearch; and U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.

In the four subjects presented in table 4, more high school-level teachers reported a main assignment in that subject in 2011–12 than in 2003–04, except in social science. However, in all four subjects, tests for differences between the 2011–12 and 2007–08 estimates were not statistically significant.

Among the four selected subjects in table 4, the percentages of teachers in 2011–12 with both an in-field major and in-field certification were not significantly different from 2003–04. Additionally, social science was the only subject to change in 2011–12 compared to 2007–08, from 74 percent to 68 percent. Similarly, for teachers with only a major or only a certification, the percentages of teachers did not change in any selected subjects between 2003–04 and 2011–12. Only in social science did the percentages change between 2007–08 and 2011–12, from 21 percent to 27 percent. No changes were detected between 2003–04 and 2011–12 in the percentages of teachers of any selected subject with neither a certification nor a major in their main assignment.

Class- and Student-Level Findings: Selected Subject Areas

Not all teachers instruct the same number of classes, and not all classes have the same number of students. Class- and student-level analyses[10] offer additional insight into the qualifications of teachers that classrooms and individual students experience. At the same time, some grade 9–12 classes are taught by teachers who do not fit the definition of high school-level teachers; that is, some classes are taught by teachers of grade 9 who also teach lower grades. The analyses below are conducted at the class and student levels to capture characteristics that may be hidden if qualifications are examined only at the teacher level.

This section presents an analysis of teacher qualifications at the class and student levels to examine what percentages of classes and students, respectively, are taught by teachers with the range of qualification categories examined in this report. Tables 5 and 6 present estimates of grade 9–12 classes and students taught in various subject areas by teachers who hold different combinations of majors and certifications. Both tables consider all departmentalized teachers of grades 9–12 who taught a class in one or more of the 11 broad field or 9 subfield areas examined in this report. Table 5 presents the percentage of public grade 9–12 classes of the various subject areas instructed by a teacher with a major or certification in that specific subject area.

[10] SASS was designed as a representative sample of teachers. Class- and student-level estimates are based on classes and students taught by teachers in SASS and may not be representative of classes and students nationwide.

Table 6 shows the percentage of students in public grade 9–12 classes taught by a teacher with a major or certification in that subject area.

Grade 9–12 Classes by Teacher Qualifications and Subject Area

Table 5 displays the number and percentage of grade 9–12 classes instructed by a teacher with a major and certification in the subject area. The four most frequently reported grade 9–12 classes taught by departmentalized teachers in 2011–12 were English (692,700 classes), mathematics (647,500), science (555,100), and social science (518,100). Among the selected subjects of foreign languages, there were 47,400 classes in French, 12,700 in German, 7,600 in Latin, and 215,600 in Spanish. In the selected arts, there were 138,200 classes in art/arts and crafts, 111,500 in music, and 47,800 in dance/drama or theater.

Major and/or certification in subject area

In the broad subject areas, except for German, Latin, and dance/drama or theater, more than half of grade 9–12 classes were taught by teachers with both an in-field major and an in-field certification. Furthermore, in music, more than three-quarters of classes (85 percent) were taught by a teacher with both in-field qualifications. By contrast, with the exception of biology/life sciences classes (62 percent), all subfields areas had less than 50 percent of classes taught by teachers with both qualifications.[11]

With respect to majors, except for Latin and dance/drama or theater, more than 60 percent of grade 9–12 classes in the broad fields were taught by teachers with in-field majors. Art/arts and crafts and music had more than three-quarters of classes taught by teachers with in-field majors.

[11] Economics, geography, and government/civics are not included because their estimates fail to meet reporting requirements.

Table 5.
Number and percentage of grade 9–12 public school classes of various subjects taught by a teacher with a major and certification in that subject area, by selected subject areas: 2011–12

Selected subject area	Number of classes	Percent with a major in subject area			Percent with no major in subject area			Total certified
		Total	Certified	Not certified	Total	Certified	Not certified	
English	692,700	76.9	66.8	10.0	23.1	13.0	10.1	79.9
Mathematics	647,500	68.0	60.3	7.7	32.0	19.5	12.5	79.8
Science	555,100	77.6	70.9	6.6	22.4	13.2	9.2	84.2
Biology/life sciences	222,900	71.0	62.2	8.8	29.0	15.9	13.0	78.2
Physical science	306,100	41.7	33.5	8.2	58.3	27.5	30.8	61.0
Chemistry	106,700	41.0	29.3	11.7	59.0	35.0	24.0	64.3
Earth sciences	62,800	30.9	22.9	8.1!	69.1	26.8	42.3	49.6
Physics	60,700	40.8	29.1	11.7!	59.2	22.8	36.4	51.9
Social science	518,100	77.7	66.6	11.1	22.3	14.7	7.6	81.3
Economics	46,700	10.1!	‡	7.9!	89.9	15.6!	74.3	17.8!
Geography	41,700	‡	‡	‡	98.0	12.9	85.1	13.8
Government/civics	82,300	7.1!	‡	4.3!	92.9	14.7	78.3	17.4
History	271,600	51.2	21.7	29.6	48.8	9.8	38.9	31.5
French	47,400	79.0	69.4	9.6	21.0	10.4	10.6!	79.8
German	12,700	81.8	66.0	‡	18.2!	‡	‡	76.8
Latin	7,600	60.1!	56.9!	‡	39.9!	‡	‡	93.2
Spanish	215,600	72.1	63.1	9.0	27.9	20.3	7.6!	83.4
Art/arts and crafts	138,200	80.8	72.6	8.2	19.2	10.4	8.7	83.0
Music	111,500	90.3	84.7	5.6!	9.7	5.3!	4.4!	90.0
Dance/drama or theater	47,800	65.8	44.5	‡	34.2	16.2!	18.0	60.7

! Interpret data with caution. The standard error for this estimate is between 30 percent and 50 percent of the estimate's value.

‡ Reporting standards not met. The standard error for this estimate is 50 percent more of the estimate's value.

NOTE: Grade 9–12 classes include classes taught to students in any of grades 9–12 by teachers in traditional public and public charter schools. Each subject area includes several subfields. Under science and social science, several subfields are examined in detail. These subfields are not inclusive of all subfields in the subject and, therefore, do not add to the broad field total. Majors are included regardless of whether they were held within or outside the school/college of education. Majors in main assignment are credited if they were held at the bachelor's degree level or higher. A certification is credited if it is a regular or standard state certificate or a probationary in-subject certification and at the secondary level. Detail may not sum to totals because of rounding and because some data are not shown. Not all apparent differences are significant.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.

At the subfield level, with the exception of biology/life sciences, less than half of classes were taught by teachers with in-field majors. However, the percentages of subfield classes with teachers holding an in-field major ranged from 7 percent in classes of government/civics to 71 percent in biology/life sciences.

As shown in the last data column, "Total certified," more than half of classes for all broad subject areas were taught by teachers with an in-field certification, except dance/drama or theater. Of these broad subject area classes, all but French, German, and dance/drama or theater had more than 75 percent of classes taught by teachers with an in-field certification. While the social science subfields had less than 40 percent of classes taught by teachers with an in-field certification, the

science subfields ranged from 50 percent in classes of earth sciences to 78 percent of classes in biology/life sciences.

In certain broad subject areas, namely English, French, German, Latin, art/arts and crafts, music, and dance/drama or theater, no differences were detected between the percentages of classes taught by teachers who held in-field majors (second data column) and the percentages of classes instructed by teachers who held in-field certifications (last data column). Mathematics (80 percent), science (84 percent), social science (81 percent), and Spanish (83 percent), by contrast, had higher percentages of classes instructed by a teacher with an in-field certification than with an in-field major (68 percent, 78 percent, 78 percent, and 72 percent, respectively).[12] At the subfield level, biology/life sciences, physical science, chemistry, earth sciences, and government/civics had larger percentages of classes instructed by a teacher who held an in-field certification than an in-field major. History classes, by contrast, had a larger percentage of classes that were instructed by a teacher who held a major in history (51 percent) than who held a certification in history (32 percent). In economics and physics, tests for differences were not significant between the percentage of classes instructed by teachers who held an in-field major and the percentage of classes instructed by teachers who held an in-field certification.

Some 91 percent of all science classes were taught by teachers with a major and/or a certification in one field of science (i.e., were not taught by a teacher with neither a major nor a certification in science).[13] Similarly, 87 percent of biology/life sciences classes were taught by teachers with a major and/or a certification in biology/life sciences. In contrast, 69 percent of physical science classes were taught by teachers with one or both qualifications in physical sciences. In the subfields of physical science, 76 percent of chemistry classes were taught by teachers with one or both qualifications in chemistry; 58 percent of earth sciences classes were taught by teachers with one or both qualifications in earth sciences; and 64 percent of physics classes were taught by teachers with one or both qualifications in physics.

Some 92 percent of all social science classes were taught by teachers with one or both credentials in one field of social science. At the subfield level, however, 61 percent of history classes were taught by teachers with an in-field credential, and

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[12] Despite the large apparent difference, the percent of classes taught by teachers with a major in Latin is not statistically significant from the percent of classes taught by teachers with a certification in Latin, possibly due to small cell sizes and large standard errors.

[13] Figures for the percentage of classes taught by a teacher with a major and/or certification in a particular subject area are obtained by subtracting the percentage of classes taught by a teacher who had no major and no certification in the subject area (column 7) from 100 percent (e.g., 100 percent minus 9.2 percent equals approximately 91 percent).

about one-quarter or fewer of the classes in economics, geography, and government/civics were taught by teachers who held one or both credentials in the specific subfield taught. These data suggest that relatively large percentages of social science teachers hold general social science credentials or teach classes in subfields other than the fields in which they are qualified.

Neither major nor certification in subject area

Except for French and dance/drama or theater, less than 15 percent of classes in the broad subject areas were taught by teachers with neither an in-field major nor an in-field certification, as seen in penultimate column of Table 5.

However, the percentages have greater variation among subfields than broad fields. In subfields of science, 13 percent of biology/life sciences classes, 31 percent of physical science classes, 24 percent of chemistry classes, 42 percent of earth science classes, and 36 percent of physics classes were taught by a teacher with neither a major nor a certification in the subject area. Likewise in the subfields of social science, a teacher with neither in-field qualifications taught 74 percent of economics classes, 85 percent of geography classes, 78 percent of government classes, and 39 percent of history classes.

Students in Grade 9–12 Classes by Teacher Qualifications and Subject Area

Table 6 displays the number and percentage of students in grade 9–12 classes instructed by a teacher with a major and certification in the subject area. The four subjects with the largest number of students were English (16,413,000 students), mathematics (14,807,000), science (13,559,000), and social science (13,620,000). Among the selected subjects of foreign languages, there were 1,038,000 students in French, 353,000 students in German, 147,000 students in Latin, and 5,177,000 students in Spanish. In the selected arts, there were 3,219,000 students in art/arts and crafts, 3,195,000 students in music, and 1,208,000 students in dance/drama or theater.

Table 6.
Number and percentage of students in grade 9–12 public school classes of various subjects taught by a teacher with a major and certification in that subject area, by selected subject areas: 2011–12

Selected subject area	Number of students	Percent with a major in subject area			Percent with no major in subject area			Total certified
		Total	Certified	Not certified	Total	Certified	Not certified	
English	16,413,000	78.5	68.6	9.9	21.5	13.0	8.5	81.7
Mathematics	14,807,000	70.2	61.5	8.7	29.8	19.3	10.5	80.8
Science	13,559,000	78.8	72.1	6.7	21.2	12.5	8.7!	84.6
Biology/life sciences	5,404,000	71.7	62.5	9.2	28.3	15.8	12.5	78.3
Physical science	7,631,000	41.8	33.6	8.2	58.2	28.3	29.9	61.9
Chemistry	2,688,000	40.7	29.5	11.2	59.3	37.0	22.3	66.5
Earth sciences	1,544,000	31.2	22.8	8.4!	68.8	29.3	39.5	52.1
Physics	1,553,000	38.5	28.1	10.4!	61.5	20.0	41.5	48.1
Social science	13,620,000	78.9	67.6	11.3	21.1	14.7	6.4	82.3
Economics	1,238,000	10.5!	‡	8.0!	89.5	16.1!	73.4	18.7!
Geography	1,143,000	‡	‡	‡	98.1	12.9	85.2	13.8
Government/civics	2,014,000	7.1!	‡	4.1!	92.9	14.6	78.3	17.6
History	7,267,000	53.6	23.2	30.4	46.4	9.3	37.0	32.5
French	1,038,000	76.8	67.9	8.9!	23.2!	11.1!	‡	79.1
German	353,000	78.4	66.4	‡	‡	‡	‡	72.5
Latin	147,000	57.9!	55.1!	‡	42.1!	‡	‡	94.2
Spanish	5,177,000	73.9	64.4	9.5	26.1	20.4	5.6	84.9
Art/arts and crafts	3,219,000	80.1	70.8	9.3	19.9	12.3	7.5	83.1
Music	3,195,000	90.7	85.2	5.4!	9.3	5.0!	4.4!	90.2
Dance/drama or theater	1,208,000	65.6	47.0	‡	34.4	16.4!	18.0!	63.5

! Interpret data with caution. The standard error for this estimate is between 30 percent and 50 percent of the estimate's value.

‡ Reporting standards not met. The standard error for this estimate is 50 percent more of the estimate's value.

NOTE: Grade 9–12 classes include classes taught to students in any of grades 9–12 by teachers in traditional public and public charter schools. Each subject area includes several subfields. Under science and social science, several subfields are examined in detail. These subfields are not inclusive of all subfields in the subject and, therefore, do not add to the broad field total. Majors are included regardless of whether they were held within or outside the school/college of education. Majors in main assignment are credited if they were held at the bachelor's degree level or higher. A certification is credited if it is a regular or standard state certificate or a probationary in-subject certification and at the secondary level. Detail may not sum to totals because of rounding and because some data are not shown. Not all apparent differences are significant.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.

Major and/or certification in subject area

Similar to the results in table 5, table 6 shows that more than half of grade 9–12 students taking classes in all broad subject areas except German, Latin, and dance/drama or theater were taught by a teacher who had a major and certification in that subject area. The only subject where more than three-quarters of students were taught by a teacher with both in-field qualifications was music. With the

exception of biology/life sciences (62 percent), all subfields had fewer than 40 percent of students in classes taught by teachers with both qualifications.[14]

More than half of students taking classes in broad subject areas in grades 9–12, except for Latin, were taught by teachers with in-field majors. Furthermore, in English, social science, and music, more than three-quarters of students were taught by teachers with in-field majors. However, with the exception biology/life sciences (72 percent), the subfields had less than 50 percent of students in classes taught by teachers with an in-field major.

Similarly, the last data column, "Total certified," indicates more than 75 percent of students in grades 9–12 across all broad subject areas, with the exception of French, German, and dance/drama or theater, were taught by teachers with in-field certifications. More than half of students in the science subfields of biology/life science (78 percent), physical science (62 percent), and chemistry (67 percent) were taught by teachers with in-field certifications. Conversely, less than 40 percent of all students in grade 9–12 classes in the social science subfields were taught by teachers with in-field certifications.

Some 91 percent of all science students were taught by teachers with a major in one field of science and/or a certification in one field of science (i.e., were not taught by a teacher with neither a major nor a certification in science). Similarly, 88 percent of biology/life sciences students were taught by teachers with a major and/or a certification in biology/life sciences. In contrast, 70 percent of physical science students were taught by teachers with one or both qualifications in physical sciences, and for earth sciences, 61 percent of students were taught by teachers who majored and/or were certified in earth sciences.

Some 94 percent of all social science students were taught by teachers with one or both social science credentials. Among the subfields, 63 percent of history students were taught by teachers with one or both credentials in history, while 27 percent or less of the students in economics, geography, and government/civics were taught by teachers who held any credentials in the specific subfield taught. These data suggest that relatively large percentages of social science teachers may hold general social science credentials or teach classes in subfields other than the fields in which they are qualified.

[14] Economics, geography, and government/civics are not included because their associated estimates fail to meet reporting requirements.

Across all the broad subject areas, mathematics and Spanish had a higher percentage of students instructed by teachers with in-field certifications (81 percent and 85 percent, respectively) than by teachers with in-field majors (70 percent and 74 percent, respectively). The subfields of physical science, chemistry, and earth sciences also had higher percentages of students instructed by teachers with in-field certification than by teachers with in-field majors. By contrast, of all the fields and subfields, only history had a higher percentage of students instructed by teachers with an in-field major than by teachers with in-field certification.[15]

Neither major nor certification in subject area

Except for dance/drama or theater, less than 15 percent of students in grade 9–12 classes across all broad subject areas were taught by a teacher with neither an in-field major nor an in-field certification, as seen in the penultimate column of Table 6.[16]

However, with the exception of biology/life sciences, the percentages of students with teachers holding neither qualification were higher than 15 percent in the various subfields. In the subfields of science, 30 percent of students in physical science classes, 22 percent of students in chemistry classes, 40 percent of students in earth science classes, and 41 percent of students in physics classes were taught by a teacher with neither a major nor a certification in the subject area. Likewise in the subfields of social science, a teacher with neither qualification taught 73 percent of students in economics classes, 85 percent of students in geography classes, 78 percent of students in government/civics classes, and 37 percent of students in history classes.

[15] Geography is not included because its associated estimate fails to meet reporting requirements.
[16] French, German, and Latin are not included because their associated estimates fail to meet reporting requirements.

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Summary and Limitations

Summary

In 2011–12, the four most frequently reported main assignments for public high school-level teachers who taught in departmentalized classes were English (152,400 teachers), mathematics (144,800), science (126,300), and social science (120,800) (table 1). Among the selected subjects of foreign languages, 11,900 teachers reported a main assignment in French, 3,300 in German, 1,400 in Latin, and 50,500 in Spanish. In the selected arts, 33,400 teachers reported a main assignment in art/arts and crafts, 38,500 in music, and 10,000 in dance/drama or theater.

In 9 of the 11 broad subject areas, more than half of teachers instructed all classes in their main assignments: the exceptions were German and dance/drama or theater (table 1) and held a major in their respective main assignments with the exception of Latin (table 2). Additionally, more than three-quarters of teachers of English (79 percent), science (80 percent), and social science (79 percent) held a major in their main assignments. About 70 percent of teachers with a main assignment in mathematics held a major in mathematics. Furthermore, in 9 of the 11 broad subject fields, more than half of teachers held both a major and certification, except for Latin and dance/drama or theater.

Because teachers instructed other classes outside their main assignment field, the analysis examined the qualifications of teachers by classes within their main assignment. The findings indicate that across the four selected subject areas (English, mathematics, science, and social science), more than half of teachers who instructed all their classes in their main assignments held both majors and certifications in these assignments (table 3). Of the four subjects, less than 10 percent of teachers who taught all classes in their main assignments had neither an in-field major nor a certification.

The analysis also examined the percentage of teachers with both a major and certification in their main assignment, only a major or a certification, and neither a major nor a certification across three administrations of SASS (i.e., 2003–04, 2007–08, and 2011–12). In English, mathematics, science, and social science, the percentages of teachers in 2011–12 with both an in-field major and in-field certification were not significantly different from 2003–04. Additionally, social science was the only subject to change in 2011–12 compared to 2007–08, from 74

percent to 68 percent. No changes were detected between 2003–04 and 2011–12 in the percentages of teachers of any selected subject with neither a certification nor a major in their main assignment. Because teachers may instruct different numbers of classes, and classes are not of equal size, the analysis also examined rates of qualifications at both the class and student levels. At the class level, in 8 of the 11 broad subject areas, more than half of grade 9–12 classes were taught by teachers with both an in-field major and an in-field certification, except for German, Latin, and dance/drama or theater (table 5). Less than 15 percent of classes in the broad subject areas were taught by teachers with neither an in-field major nor an in-field certification, except for French and dance/drama or theater.[17] More than half of students in all broad subject areas except for German, Latin, and dance/drama or theater were taught by a teacher who had a major and certification in that subject area (table 6).

Limitations

Readers should be aware of all limitations in the analysis for this report. First, direct comparisons across the teacher-, class-, and student-level estimates should be interpreted with caution. Although the subpopulations used in these different analyses largely overlap, the differences should not be disregarded. The teacher-level subpopulation counts teachers only once, based on their main assignments, and only counts teachers whose main teaching assignment is in one of 20 selected subjects in any of grades 10–12 (although they may teach lower grades as well) or grade 9 and no grade lower. As a result, readers should be careful not to generalize beyond this population, which represents 64 percent of all public high school-level teachers. By contrast, at the class and student levels, the teacher subpopulation includes all departmentalized teachers who taught classes or students in grades 9–12, regardless of other grades taught. Furthermore, the class- and student-level subpopulations may include teachers multiple times, once for each different subject they instruct. Therefore, an individual teacher's qualifications may be represented multiple times in these estimates.

Readers should also be aware of the narrow definition of in-field qualifications for the subfields of science and social science. Direct certification matches at the subfield level are difficult to obtain for all specific subject areas. Not all subjects included in the broad fields of science and social science are represented in the subfields. Therefore, inconsistencies may be observed when comparing subfield-level

[17] German and Latin are not included because their associated estimates fail to meet reporting requirements.

estimates with broad field-level estimates. Furthermore, the scope of this report does not include an investigation into whether states offer certifications in subfield areas of science and social science. States may not offer certification in the subfields, which may result in lower percentages of teachers who hold certifications in subfield areas.

Readers are cautioned against making direct comparisons between estimates in this report and previously published estimates that use data from the 1999–2000 and prior administrations of SASS. Several substantial changes were implemented in the 2003−04 SASS Teacher Questionnaire and carried over into subsequent administrations, such as alterations to the way certifications were matched to main assignments and grade levels. Additional changes were made to the 2011–12 SASS Teacher Questionnaire, although these changes do not affect comparisons to 2003–04 and 2007–08 data. All changes are documented in appendix C.

Finally, although teachers' majors and certifications offer substantial information regarding their qualifications, other measures could be used, such as a teachers' highest degree achieved, or certification from the National Board for Professional Teaching Standards. Readers are encouraged to explore alternative measures available in the SASS data.

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Appendix A—Standard Error Tables

Table A-1.
Standard errors for Table 1: Number of public high school-level teachers who reported a particular main assignment and the percentage of teachers who taught various percentages of classes within that main assignment, by subject of main assignment: 2011–12

Selected main assignment	Number of teachers	Among teachers of a particular main assignment, the percentage who teach: 0 to 49.9 percent of their classes in their main assignment	50 to 99.9 percent of their classes in their main assignment	100 percent of their classes in their main assignment
English	6,420	0.60	1.58	1.64
Mathematics	6,330	0.33	0.99	0.96
Science	4,950	0.43	1.12	1.19
Biology/life sciences	3,460	1.72	2.43	2.42
Physical science	3,430	0.83	2.24	2.26
Chemistry	2,100	2.69	3.96	4.56
Earth sciences	1,750	5.09	5.30	6.98
Physics	1,610	2.33	6.51	6.06
Social science	5,450	0.45	1.38	1.46
Economics	1,880	7.75	10.00	9.26
Geography	1,680	8.20	8.90	8.45
Government/civics	1,800	4.26	6.10	6.06
History	3,610	1.31	3.01	2.96
French	1,580	†	4.28	4.38
German	760	†	11.89	11.89
Latin	450	†	†	16.04
Spanish	3,560	†	1.63	1.62
Art/arts and crafts	2,380	0.65	2.43	2.52
Music	2,390	†	1.47	1.62
Dance/drama or theater	2,530	†	8.98	9.01

† Not applicable. Reporting standards not met.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.

Table A-2.
Standard errors for Table 2: Number of public high school-level teachers who reported a particular main assignment and the percentage with a major and certification in that main assignment, by subject of main assignment: 2011–12

Selected main assignment	Number of teachers	Percent with a major in main assignment			Percent with no major in main assignment			Total certified
		Total	Certified	Not certified	Total	Certified	Not certified	
English	6,420	1.28	1.35	1.12	1.28	1.06	0.96	1.35
Mathematics	6,330	1.89	1.82	1.18	1.89	1.74	1.24	1.51
Science	4,950	1.73	1.94	1.01	1.73	1.40	1.44	1.81
Biology/life sciences	3,460	2.68	3.25	2.07	2.68	1.85	2.38	3.30
Physical science	3,430	2.76	2.53	1.57	2.76	2.50	2.30	2.80
Chemistry	2,100	3.77	3.47	2.83	3.77	4.02	3.58	4.50
Earth sciences	1,750	7.28	7.38	†	7.28	6.35	6.52	6.96
Physics	1,610	6.19	5.24	4.57	6.19	4.43	5.91	5.86
Social science	5,450	1.60	1.75	1.28	1.60	1.52	0.89	1.47
Economics	1,880	†	†	†	6.95	7.56	8.24	8.35
Geography	1,680	†	†	†	1.17	4.22	4.48	4.49
Government/civics	1,800	3.34	†	2.52	3.34	5.87	7.14	6.55
History	3,610	2.81	2.81	2.52	2.81	1.78	2.68	2.75
French	1,580	4.68	5.13	2.62	4.68	2.96	3.89	4.55
German	760	6.58	9.53	†	6.58	†	†	7.59
Latin	450	18.03	18.97	†	18.03	17.97	†	16.37
Spanish	3,560	2.85	3.64	2.28	2.85	2.82	1.35	2.57
Art/arts and crafts	2,380	2.84	3.38	2.91	2.84	1.96	1.98	3.07
Music	2,390	1.61	2.29	1.27	1.61	1.38	0.84	1.42
Dance/drama or theater	2,530	8.68	9.29	†	8.68	7.86	2.87	11.98

† Not applicable. Reporting standards not met.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.

Table A-3.
Standard errors for Table 3: Number of public high school-level teachers who reported a particular main assignment and the percentage of teachers with various qualifications who taught various percentages of classes within that main assignment, by subject of main assignment: 2011–12

Selected main assignment	Number of teachers	Percent with a major and certification in their main assignment	Percent with only a major or only a certification in their main assignment	Percent with neither a major nor a certification in their main assignment
English	6,420	1.35	1.29	0.96
Percentage of classes taught in English				
0 to 49.9	950	17.08	10.81	10.40
50 to 99.9	3,040	2.97	2.54	2.03
100	4,870	1.63	1.53	1.11
Mathematics	6,330	1.82	1.86	1.24
Percentage of classes taught in mathematics				
0 to 49.9	500	10.75	†	10.93
50 to 99.9	1,420	4.58	4.24	2.98
100	6,070	1.98	1.99	1.38
Science	4,950	1.94	1.60	1.44
Percentage of classes taught in science				
0 to 49.9	550	15.27	†	12.14
50 to 99.9	1,440	4.83	4.08	3.10
100	4,780	1.88	1.65	1.60
Social science	5,450	1.75	1.76	0.89
Percentage of classes taught in social science				
0 to 49.9	550	9.67	9.87	7.91
50 to 99.9	1,860	4.10	4.36	2.77
100	4,950	2.03	2.03	0.96

† Not applicable. Reporting standards not met.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.

Table A-4.
Standard errors for Table 4: Number of public high school-level teachers who reported a main assignment and the percentage with various qualifications in that main assignment, by subject of main assignment: 2003–04, 2007–08, and 2011–12

Selected main assignment	Number of teachers			Percent with a major and a certification in their main assignment			Percent with only a major or only a certification in their main assignment			Percent with neither a major nor a certification in their main assignment		
	2003–04	2007–08	2011–12	2003–04	2007–08	2011–12	2003–04	2007–08	2011–12	2003–04	2007–08	2011–12
English	4,830	7,480	6,420	1.12	1.45	1.35	0.95	1.21	1.29	0.59	0.81	0.96
Mathematics	3,593	5,740	6,330	1.44	1.53	1.82	1.12	1.42	1.86	0.85	1.12	1.24
Science	4,291	5,610	4,950	1.12	1.44	1.94	1.03	1.33	1.60	0.68	0.74	1.44
Social science	3,392	5,100	5,450	1.39	1.44	1.75	1.41	1.38	1.76	0.64	0.79	0.89

SOURCE: Morton, B.A., Hurwitz, M.D., Strizek, G.A., Peltola, P., and Orlofsky, G.F. (2008). *Education and Certification Qualifications of Departmentalized Public High School-Level Teachers of Core Subjects: Evidence From the 2003–04 Schools and Staffing Survey* (NCES 2008-338). U.S. Department of Education. Washington, DC: National Center for Education Statistics, Institute of Education Sciences; Hill, J.G. (2011). *Education and Certification Qualifications of Departmentalized Public High School-Level Teachers of Core Subjects: Evidence From the 2007-08 Schools and Staffing Survey* (NCES 2011-317). U.S. Department of Education, National Center for Education Statistics. Retrieved January 16, 2014 from http://nces.ed.gov/pubsearch; U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.

Table A-5.
Standard errors for Table 5: Number and percentage of grade 9–12 public school classes of various subjects taught by a teacher with a major and certification in that subject area, by selected subject areas: 2011–12

Selected subject area	Number of classes	Percent with a major in subject area			Percent with no major in subject area			
		Total	Certified	Not certified	Total	Certified	Not certified	Total certified
English	28,540	1.41	1.58	1.27	1.41	1.07	1.08	1.52
Mathematics	30,590	1.67	1.80	1.11	1.67	1.45	1.24	1.51
Science	24,290	1.95	2.05	0.96	1.95	1.46	1.73	1.94
Biology/life sciences	13,960	2.36	2.43	1.47	2.36	2.16	1.99	2.41
Physical science	16,930	2.46	2.37	1.55	2.46	2.30	2.52	2.96
Chemistry	9,440	3.57	3.36	2.56	3.57	3.81	3.41	4.02
Earth sciences	7,020	5.42	5.37	2.96	5.42	4.77	5.76	6.15
Physics	8,300	6.52	5.13	4.04	6.52	4.20	7.20	6.27
Social science	25,110	1.59	1.77	1.21	1.59	1.56	1.01	1.41
Economics	7,190	4.06	†	3.43	4.06	5.21	5.77	5.77
Geography	7,300	†	†	†	1.00	3.69	3.86	3.82
Government/civics	6,910	2.62	†	2.07	2.62	3.99	5.00	4.52
History	15,640	2.81	2.55	2.59	2.81	1.58	2.67	2.56
French	6,850	5.01	5.36	2.61	5.01	2.73	4.84	5.17
German	2,530	8.50	10.90	†	8.50	†	†	9.42
Latin	2,400	19.64	20.92	†	19.64	†	†	5.95
Spanish	15,250	3.44	3.90	2.37	3.44	3.02	2.68	3.19
Art/arts and crafts	11,020	2.82	3.29	2.12	2.82	2.02	2.12	2.64
Music	9,400	2.37	3.03	1.81	2.37	1.80	1.80	2.23
Dance/drama or theater	11,950	8.16	9.63	†	8.16	6.36	5.26	11.70

† Not applicable. Reporting standards not met.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.

Table A-6.
Standard errors for Table 6: Number and percentage of students in grade 9–12 public school classes of various subjects taught by a teacher with a major and certification in that subject area, by selected subject areas: 2011–12

Selected subject area	Number of students	Percent with a major in subject area			Percent with no major in subject area			Total certified
		Total	Certified	Not certified	Total	Certified	Not certified	
English	706,200	1.55	1.63	1.19	1.55	1.22	0.94	1.38
Mathematics	639,700	1.61	1.77	1.30	1.61	1.44	1.08	1.57
Science	747,000	2.73	2.72	0.89	2.73	1.36	2.66	2.69
Biology/life sciences	358,700	2.57	2.63	1.31	2.57	2.02	2.18	2.48
Physical science	584,700	2.90	2.72	1.59	2.90	2.77	3.54	3.73
Chemistry	270,500	3.91	3.63	2.53	3.91	4.57	3.26	3.77
Earth sciences	161,600	5.12	5.00	3.36	5.12	4.58	4.85	5.39
Physics	389,600	9.15	6.86	4.04	9.15	4.89	11.87	9.91
Social science	708,900	1.61	1.84	1.35	1.61	1.55	0.95	1.38
Economics	193,000	4.57	†	3.43	4.57	5.48	6.22	6.34
Geography	224,700	†	†	†	1.03	3.85	3.97	3.92
Government/civics	188,100	2.88	†	1.71	2.88	3.86	5.00	4.78
History	421,900	2.70	2.70	2.55	2.70	1.52	2.62	2.64
French	171,000	7.24	7.00	2.69	7.24	3.68	†	7.14
German	106,900	12.79	13.85	†	†	†	†	13.08
Latin	47,400	20.37	21.38	†	20.37	†	†	5.31
Spanish	393,900	3.12	3.71	2.60	3.12	3.09	1.58	2.78
Art/arts and crafts	282,500	3.19	3.60	2.47	3.19	2.88	1.79	2.45
Music	290,300	2.59	2.88	1.66	2.59	1.67	2.07	2.29
Dance/drama or theater	321,700	7.87	10.12	†	7.87	6.31	5.60	11.64

† Not applicable. Reporting standards not met.
SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2011–12.

Appendix B—Technical Notes and Methodology

The data used in this report come from the 2011–12 Schools and Staffing Survey (SASS) Restricted-Use Public School Teacher Data File. The following section contains an overview of the SASS and an explanation of the multiple levels of analysis, differing subpopulations, and the measures (subjects taught and teacher qualifications) used in this report.

Overview of the Schools and Staffing Survey

The Schools and Staffing Survey (SASS) is sponsored by the National Center for Education Statistics (NCES) of the Institute of Education Sciences within the U.S. Department of Education and is conducted by the U.S. Census Bureau. SASS is a nationally representative sample survey of public[1] and private K–12 schools, principals, and teachers in the 50 states and the District of Columbia. School districts associated with public schools and library media centers are also part of SASS. Conducted seven times, SASS data covers school years 1987–88, 1990–91, 1993–94, 1999–2000, 2003–04, 2007–08, and 2011–12.

For additional information on the specific SASS-related topics discussed in this appendix, consult the *Documentation for the 2011–12 Schools and Staffing Survey* (Graham et al. forthcoming) or the *User's Manual for the 2011–12 Schools and Staffing Survey*, vols. 1–6 (Goldring et al. 2013). For general information on SASS, visit http://nces.ed.gov/surveys/sass.

Teacher Questionnaire (Form SASS-4A)

The data in this report were collected using the 2011–12 Teacher Questionnaire, which was designed to obtain information on topics such as classroom organization, teaching assignment, education and training, certification, workload, and perceptions and attitudes about teaching. Questionnaires from all SASS administrations are available online at http://nces.ed.gov/surveys/sass/questionnaire.asp.

[1] Public schools include traditional public and charter schools.

SASS Teacher-Level Estimates and Target Population

SASS is designed to produce national, regional, and state estimates for public elementary and secondary schools and their related components (teachers, principals, school districts, and school library media centers). Data from the SASS Teacher Questionnaire are designed to support comparisons of public school teachers with different levels of experience (1 year of experience, 3 years or less of experience, or more than 3 years of experience) at the state level. Comparisons by race/ethnicity and full- or part-time status are supported at the national level.

Sample Selection

Public schools. The starting point for the 2011–12 SASS public school sampling frame was the preliminary 2009–10 Common Core of Data (CCD) Nonfiscal School Universe Data File. The sampling frame was adjusted from the CCD in order to fit the definition of a school eligible for SASS. To be eligible for SASS, a school was defined as an institution or part of an institution that provides classroom instruction to students; has one or more teachers to provide instruction; serves students in one or more of grades 1–12 or the ungraded equivalent; and is located in one or more buildings apart from a private home. It was possible for two or more schools to share the same building; in this case, they were treated as different schools if they had different administrators (i.e., principal or school head).

The SASS definition of a school is generally similar to the CCD definition, with some exceptions. SASS is confined to the 50 states plus the District of Columbia and excludes the other jurisdictions and Department of Defense overseas schools. The CCD includes some schools that do not offer teacher-provided classroom instruction in grades 1–12 or the ungraded equivalent. In some instances, schools in the CCD are essentially administrative units that may oversee entities that provide classroom instruction or they may only provide funding and oversight. The CCD schools with the same location, address, and phone number were collapsed during the SASS frame building on the assumption that the respondent would consider them to be one school. Because SASS allows schools to define themselves, Census Bureau staff observed that schools generally report themselves as one entity in situations where the administration of two or more schools in the CCD is the same. A set of rules was applied in certain states to determine in which instances school records should be collapsed together. When school records were collapsed together, the student and teacher counts, grade ranges, and names as reported to the CCD were all modified to reflect the change.

Finally, additional school records were added to the sampling frame. Most of these records were for alternative, special education, or juvenile justice facilities in California, New York, and Pennsylvania. For a detailed list of frame modifications, see the *Documentation for the 2011–12 Schools and Staffing Survey* (Graham et al. forthcoming). After adding, deleting, and collapsing school records, the SASS public school sampling frame consisted of 90,530 traditional public schools and 5,080 public charter schools.

The SASS sample is a stratified probability-proportionate-to-size (PPS) sample, and all public schools underwent multiple levels of stratification. The sample was allocated so that national-, regional-, and state-level elementary, secondary, and combined public school estimates could be made. The sample was allocated to each state by grade range (elementary, secondary, and combined for charters; primary, middle, high, and combined for traditional public schools) and school type (traditional public vs. public charter). For a full description of the allocation procedure, see the *Documentation for the 2011–12 Schools and Staffing Survey* (Graham et al. forthcoming). Within each stratum, all public schools were systematically selected using a PPS algorithm. The measure of size used for the schools was the square root of the number of full-time-equivalent teachers reported or imputed for each school during the sampling frame creation. Any school with a measure of size greater than the sampling interval (the inverse of the rate at which the sample is selected) was included in the sample with certainty and thus automatically excluded from the probability sampling operation. These sampling procedures resulted in a total public school sample of about 10,250 traditional public schools and 750 public charter schools.

Public school teachers. Teachers in SASS are defined as staff who teach regularly scheduled classes to students in any of grades K–12. Teacher rosters (Teacher Listing Forms) were collected from sampled schools, primarily by mail, and compiled at the Census Bureau. This compilation was done on an ongoing basis throughout the roster collection period. Along with the names of teachers, respondents at the sampled schools were asked to provide information about each person's teaching experience (1st year, 2–3 years, 4–19 years, or 20 or more years), teaching status (full- or part-time), and subject matter taught (special education, general elementary, math, science, English/language arts, social studies, vocational/technical, or other).

Sampling of teachers was also done on an ongoing basis throughout the roster collection period. The Census Bureau first stratified teachers into four groups: beginning teachers (in their 1st year of teaching); early-career teachers (in their 2nd or 3rd years of teaching); mid-career teachers (in their 4th through 19th years of teaching); and experienced teachers (in their 20th or later years of teaching). Beginning and early-career teachers were oversampled to improve the survey

estimates for these subpopulations. Teachers within a school were sorted by the teacher stratum code, the subject matter taught, and the teacher line number code. The teacher line number was assigned to identify the individual within the teacher list. Within each teacher stratum in each school, teachers were selected systematically with equal probability.

Sampling rates for teachers varied between the strata listed above. The maximum number of teachers per school was set at 20 so that a school would not be overburdened by sampling too large a proportion of its teachers. About 20 percent of the eligible public schools did not provide teacher lists. For these schools, no teachers were selected. Within each teacher stratum in each school, teachers were selected systematically with equal probability. About 51,100 teachers from public schools were sampled.

Data Collection Procedures

In 2011–12, SASS utilized a combination of mail and Web reporting with subsequent telephone and in-person field follow-up. Prior to the beginning of data collection, research applications were submitted to public school districts that required them to conduct research in the schools. Starting in June 2011, all districts were contacted by telephone to verify or collect information about the district and sampled school(s) needed for data collection, identify the best person to receive the district questionnaire, and determine if the district would provide an electronic teacher list for sampled school(s). Survey packages were mailed to districts in October 2011.[2] Follow-up was conducted sequentially by mail, telephone, and in person to districts that did not provide the requested questionnaire and/or teacher list.

In preparation for school-level data collection, advance letters were mailed to the sampled schools in June 2011 to verify their addresses. School packages were mailed in October 2011.[3] Next, schools were telephoned using a computer-assisted

[2] The SASS district package contained a cover letter, the School District Questionnaire, and postage-paid return envelope. Districts that indicated they would provide electronic list(s) of teachers for their selected school(s) received a letter that explained the purpose of the teacher list and provided instructions for uploading the file. In districts with only one school, the school received the Public School Questionnaire (With District Items) in lieu of the School District Questionnaire and School Questionnaire.

[3] The SASS school package contained a cover letter to the principal; a cover letter to the survey coordinator; the Teacher Listing Form if the district could not provide it; the Public School Principal Questionnaire or Private School Principal Questionnaire; the Public School Questionnaire; the Public School Questionnaire (With District Items), or Private School Questionnaire; the School Library Media Center Questionnaire (for public schools only); postage-paid return envelopes; and the *Statistical Abstract of the United States: 2011* CD.

telephone-interviewing (CATI) instrument to verify school information, establish a survey coordinator (who became the main contact person at the school for subsequent communication), and follow up on the Teacher Listing Form if the school district had not already provided an electronic teacher list.

Once selected for SASS, teachers were mailed an invitation to complete the web-based questionnaire that also informed them that they could request a paper version of the questionnaire. Beginning in January 2012, nonresponding teachers were sent a paper questionnaire. Among teachers who responded to SASS, 67 percent of public school teachers completed the survey via the web instrument. Teacher questionnaires were mailed to schools on a flow basis as teachers were sampled from the data provided on the Teacher Listing Form or electronic teacher list. The field follow-up period was preceded by phone calls from the telephone centers to remind the survey coordinators to have staff complete and return all forms. Data collection ended in June 2012.

Data Processing and Imputation

The Census Bureau used both central processing and headquarters staff to check returned questionnaires, key data, and implement quality control procedures. Questionnaires that had a preliminary classification of a complete interview were submitted to undergo a series of computer edits consisting of a range check, a consistency edit, a blanking edit,[4] and a logic edit. After these edits were run and reviewed by analysts, the records were put through another edit to make a final determination as to whether the case was eligible for the survey and whether sufficient data had been collected for the case to be classified as a complete interview.

After the final edits were run, cases with "not-answered" values for items remained. Values were imputed using two main approaches. Donor respondent methods, such as hot-deck imputation, were used. If no suitable donor case could be matched, the few remaining items were imputed using the mean or mode from groups of similar cases to impute a value to the item with missing data. After each stage of imputation, computer edits were run again to verify that the imputed data were consistent with the existing questionnaire data. If that was not the case, an imputed value was blanked out by one of these computer edits due to inconsistency with other data within the same questionnaire or because it was out of the range of acceptable

[4] Blanking edits delete answers to questions that should not have been filled in (e.g., if a respondent followed a wrong skip pattern) and also add a "not-answered" code to items that should be answered but were left blank.

values. In these situations, Census Bureau analysts looked at the items and tried to determine an appropriate value. Edit and imputation flags, indicating which edit or imputation method was used, were assigned to each relevant survey variable. For further information, see the sections on data processing and imputation in *Documentation for the 2011–12 Schools and Staffing Survey* (Graham et al. forthcoming).

Response Rates

Unit response rates. The unit response rate indicates the percentage of sampled cases that met the definition of a complete interview. The weighted SASS unit response rate was produced by dividing the base-weighted number of respondents who completed questionnaires by the base-weighted number of eligible sampled cases.[5] Table B-1 presents a summary of the base-weighted unit response rates for public school teachers.

Table B-1.
Unweighted, base-weighted, and base-weighted overall response rates for the public school teacher survey population: 2011–12

Survey population	Unweighted unit response rate	Base-weighted unit response rate	Base-weighted overall response rate[1]
Public school Teacher Listing Form	82.4	79.6	†
Public school teacher	76.8	77.7	61.8

† Not applicable.
[1] The base-weighted overall response rate is estimated using the base-weighted questionnaire response rate times the base-weighted response rate for the public school Teacher Listing Form.
NOTE: To obtain base-weighted response rates, unweighted response rates are weighted using the inverse of the probability of selection.
SOURCE: U.S. Department of Education, National Center for Education Statistics, *User's Manual for the 2011–12 Schools and Staffing Survey, Volume 1: Overview.*

Overall response rates. The overall response rate represents the response rate to the survey, taking into consideration each of its stages. For teachers, the overall response rate is calculated as the product of the response rate to two stages: the Teacher Listing Form and the Teacher Questionnaire.[6] The base-weighted overall response rate for public school teachers was 61.8 percent.

Item response rates. The item response rate indicates the percentage of respondents who answered a given survey question or item. The weighted SASS item response rate is calculated by dividing the base-weighted number of respondents who

[5] For the formula used to calculate the unit response rate, see *NCES Statistical Standards* (U.S. Department of Education 2003).
[6] For the formula used to calculate the unit response rate, see *NCES Statistical Standards* (U.S. Department of Education 2003).

provided an answer to an item by the base-weighted number of respondents who were eligible to answer that item. For the public school teacher data, eight of the survey items used in this report have item response rates of less than 85 percent. These items include the number of students in the 8th class taught, 9th class taught, and 10th class taught by the teacher (83, 81, and 78 percent, respectively); the three grade range options for another certificate (84 percent each); and the three grade range options for a third content area (84 percent each). For further information on nonresponse bias analysis and item response rates, see *Documentation for the 2011–12 Schools and Staffing Survey* (Graham et al. forthcoming).

Nonresponse Bias Analysis

Because the *NCES Statistical Standards* (4-4) require analysis of nonresponse bias for any survey stage with a base-weighted response rate of less than 85 percent, all SASS files were evaluated for potential bias. As shown in table B-1, the base-weighted response rate for the Teacher Listing Form was 79.6 percent for public schools. The base-weighted response rate for the teacher survey was 77.7 percent for public school teachers.

For the public school Teacher Listing Form and public school teacher files, national-level estimates were first evaluated within charter and noncharter schools. Next, the base-weighted[7] unit response rate was calculated by state strata. If the base-weighted response rate for any state stratum was below 85 percent, a detailed comparison of respondents to the frame population was conducted by examining characteristics. For public school teachers, these characteristics were teaching subject, community type, and school level.

For the Teacher Listing Form, a difference between the frame and respondent population was considered noteworthy if the difference was statistically significant and the following three conditions were met:

- The relative difference between the frame and respondent population was greater than 10 percent;
- The absolute difference was greater than one percentage point; and
- The cell for each subpopulation contained at least 30 interviews.

[7] Unit nonresponse bias analysis was conducted using the base weight, defined as the product of the initial base weight (the inverse of the probability of selection) and the sampling adjustment factor. The sampling adjustment factor is an adjustment that accounts for circumstances that affect the school's probability of selection that are identified after the data collection has begun, such as a merger, duplication, or incorrect building-level collapsing (for example, a junior high school and a senior high school merge to become a junior/senior high school).

A comparison between the frame and the base-weighted estimates for the public school Teacher Listing Form at the national level showed evidence of bias in 43 percent of 130 potential characteristics and at the state level showed evidence of bias in 18 percent of 763 potential characteristics. When the estimates were recomputed using the nonresponse-adjusted weights and compared to the frame estimates for the public school Teacher Listing Form, the estimates show that in the set of national estimates, bias remained in 14 percent of the characteristics compared. In the state-level estimates, 10 percent were significantly biased after nonresponse adjustments.

For the public school teacher file, the criteria for noteworthy differences were changed. Given the low overall response rates for public school teachers, a decision was reached to consider all significant differences observed in the comparisons conducted for the nonresponse bias analysis (i.e., disregarding the three conditions articulated above). Using this more conservative approach, a comparison between the frame and the base-weighted estimates for the public school teacher estimates showed evidence of bias in 35 percent of the 156 characteristics compared at the national level and in 12 percent of the 956 characteristics compared at the state level. The same comparison for the public school teacher data showed that after nonresponse adjustments were applied to the weights, the percentage of estimates with measurable bias decreased to 5 percent at the national level and 5 percent at the state level.

These variables used in the analyses of nonresponse bias were limited to those used in sampling; however, much more frame information is available at the universe level for teachers. Given the extent of nonresponse in the overall response rates for teachers, NCES is taking a conservative approach of not publishing estimates where the overall response rate falls below 50 percent until such time as more extensive nonresponse bias analyses can be conducted using the more complete set of information available on the schools and districts in which the teachers work. For further information on unit response rates and nonresponse bias analysis, see *Documentation for the 2011–12 Schools and Staffing Survey* (Graham et al. forthcoming).

Weighting

The general purpose of weighting is to scale up the sample estimates to represent the target survey population. For SASS, a base weight (e.g., the inverse of the sampled teacher's probability of selection) is used as the starting point. Next, a series of nonresponse adjustment factors are calculated and applied based on a weighting cell adjustment. Weighting cells are developed using tree search algorithms. These cells are selected to be homogeneous in response propensity within cells and heterogeneous in response propensity across cells. The adjustment is the inverse of

the weighted response rate within each cell, and each respondent in the cell receives this adjustment. Nonrespondents are given a weight of zero: the respondents are reweighted to represent the nonrespondents. Finally, a ratio adjustment factor is calculated and applied to the sample to adjust the sample totals to the frame totals. The product of these factors is the final weight for each SASS respondent, which appears as TFNLWGT in the SASS Teacher data files. The teacher final weight was used for all analyses in this report. Estimates of classes and students were produced as ratios using a SUDAAN procedure, PROC RATIO. For further information on weighting, see *Documentation for the 2011–12 Schools and Staffing Survey* (Graham et al. forthcoming).

Variance Estimation

In surveys with complex sample designs, such as SASS, direct estimates of sampling errors that assume a simple random sample typically underestimate the variability in the estimates. The SASS sample design and estimation include procedures that deviate from the assumption of simple random sampling, such as stratifying the school sample, oversampling new teachers, and sampling with differential probabilities.

One method of calculating sampling errors of complex sample designs is replication. Replication methods involve constructing a number of subsamples (i.e., 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.

Each SASS data file includes a set of 88 replicate weights designed to produce variance estimates. The set of replicate weights for each file should be applied to the respondents in that file. The replicate weights for the SASS public teacher file are TREPWT1–TREPWT88.

Reliability of Data

SASS estimates are based on samples. The sample estimates may differ somewhat from the values that would be obtained from the universe of respondents using the same questionnaire, instructions, and field representatives. The difference occurs because a sample survey estimate is subject to two types of errors: nonsampling and sampling. Estimates of the magnitude of sampling error for SASS data can be derived or calculated. Nonsampling errors are attributed to many sources, including definitional difficulties, the inability or unwillingness of respondents to provide correct information, differences in the interpretation of questions, an inability to

recall information, errors made in collection (e.g., in recording or coding the data), errors made in processing the data, and errors made in estimating values for missing data. Quality control and edit procedures were used to reduce errors made by respondents, coders, and interviewers.

Tests of Significance

The tests of significance used in this analysis are based on Student's *t* statistics. The formula used to compute Student's *t* statistic is as follows:

$$t = \frac{E_1 - E_2}{\sqrt{se_1^2 + se_2^2}}$$

where E_1 and E_2 are the first and second estimates being compared, and se_1 and se_2 are the corresponding standard errors. No corrections are made for multiple comparisons. Findings are predicated on a null hypothesis that the percentage being tested is equal to another percentage, and, therefore, two-tailed *t*-tests were used throughout the report.[8]

The computation of standard errors can be done easily with one of the following software programs: WesVar Complex Sample Software, SUDAAN (written within an SAS statistical package), Stata 10, or AM Statistical Software.[9] All differences cited in the text of this report are statistically significant at the $p < .05$ level.

Levels of Analysis: Teacher, Class, and Student Levels

This report presents findings from multiple levels of analyses (teacher, class, and student) in order to provide a more comprehensive picture of teacher qualifications. The teacher-level analyses provide a clear description of the status of teachers' qualifications by subject area and relate directly to current federal education legislation. The class- and student-level analyses are critical to exploring variations in the number of classes and students instructed by teachers with different qualifications. Separate class- and student-level analyses are important because not all teachers instruct the same number of classes and not all classes have the same number of students. Taking these variations into account, the three levels of analyses

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[8] For more information on the criterion for judging statistical significance, see *NCES Statistical Standards* (U.S. Department of Education 2003).

[9] For information on each of these software programs, see their respective websites: http://www.westat.com/expertise/information_systems/wesvar, http://www.rti.org/SUDAAN, http://www.stata.com, and http://www.am.air.org.

offer a more precise picture of the numbers and percentages of classes and students being taught by teachers with various types of qualifications.

The following scenario provides an example of the relationship among the three levels: a female teacher teaches four mathematics classes and one English class, has a major and certification in mathematics, and reports mathematics as her main assignment. At the teacher level, this teacher would be considered "in-field" in her main assignment. At the class level, the teacher would be "in-field" in her mathematics classes, but not in her English class. This would result in a class-level measure of 80 percent of her classes taught by an "in-field" teacher. If all five of these classes had identical numbers of students, the student-level measure would be the same (e.g., if the enrollment of the four mathematics classes totaled 80 students and the English class had 20 students, the student-level measure would also be 80 percent). However, if a total of 60 students were enrolled in the four mathematics classes and the one English class had 40 students, the student-level measure would indicate 60 percent of this teacher's students were taught by an "in-field" teacher.

Teacher Level

Teacher-level analyses in this report consider all degrees (bachelor's and above) and certifications (probationary and above) held by teachers and compare these qualifications with the subject of their main assignments. Some teachers may or may not have in-field qualifications for additional classes they teach in subjects other than their main assignments. Tables 1–4 in this report present the percentages of teachers who instruct classes in their main assignments as well as the percentages of teachers who hold degrees and certifications in their main assignments.

Class and Student Levels

Class- and student-level analyses explore all classes taken by 9th- through 12th-graders in the 11 broad fields and 9 subfields discussed in this report. The degrees and certifications of all teachers who teach these classes are considered and compared for correspondence with each of the subject areas. At the class and student levels, teachers who instruct classes in more than one subject appear multiple times, once for each subject they teach.

Subpopulations: Teacher, Class, and Student Levels

This report examines the teacher, class, and student levels in schools to offer descriptive information about teachers. Although all tables present high school-level groups, important distinctions exist between the teacher subpopulation in the

teacher-level tables and the teacher subpopulation in the class- and student-level tables. At the teacher level, the teacher subpopulation of analysis includes departmentalized teachers who strictly fall into the high school-level teacher definition. That is, a teacher is considered a high school-level teacher if he or she instructs classes in any of grades 10–12 (and may teach lower grades as well) or grade 9 but no grade lower. At the class and student levels, the teacher subpopulation includes all departmentalized teachers who taught classes or students in grades 9–12. That is, teachers who taught a 9th-grade class and also a 6th-grade class would be included in the class- and student-level analyses but not in the teacher-level analyses. The teacher-level tables use a teacher's main assignment area as the unit of analysis, considering only one observation per teacher. Class- and student-level tables count teachers based on the different classes and assignment areas taught.

Readers should remember these differences when examining and comparing teacher-, class-, and student-level results. Although the purpose of these analyses is to provide a more complete picture of teacher qualifications, readers should take caution in making direct comparisons between tables.

Teacher-Level Subpopulation

Because the Elementary and Secondary Education Act (ESEA) of 1965, as amended in 2001, pertains to public education, the teacher-level analyses in this report include only public school teachers. Public school teachers include both traditional public school and public charter school teachers.

In addition to restricting analyses in this report to public school teachers, the analyses further narrow to include only those that teach in high school-level departmentalized classrooms. High school-level teachers are defined using items from question 13 in the SASS Teacher Questionnaire: "Do you currently teach students in any of these grades at THIS school?" As mentioned above, teachers are included if they instructed students in any of grades 10−12 (and may teach lower grades as well) or grade 9 but no grade lower. If a teacher taught grade 9 and any lower grades, the teacher would not be considered a high school-level teacher for the purposes of this report. Further, only departmentalized teachers are included in the analyses, because they represent a majority of teachers at the high school level and allow for analyses that tie specific teachers to specific classes and students.[10] Teachers of departmentalized classrooms instruct several classes of different

[10] Elementary subject specialists, teachers of self-contained classrooms, team teachers, and pull-out teachers were not included in the report because very few teach at the high school level and because of the difficultly of obtaining a substantive match between their classes and qualifications.

students most or all of the day in one or more subjects. At the high school level, there were 1,083,000 public school teachers in 2011–12. Of these teachers, 87 percent (940,600) taught in departmentalized classrooms, of whom 74 percent (693,400) taught one of the 11 broad fields or 9 subfields examined in this report. Therefore, the subpopulation of teachers in this report represents 64 percent of all public high school-level teachers. Of those 142,100 teachers not in departmentalized classrooms (and thus not included in this report), 85,400 teachers (60 percent) reported a main assignment in special education.

The findings presented in tables 1–4 of this report provide context on the frequency with which teachers instruct classes in their reported main assignments and their qualifications in relation to the main assignments.

Class- and Student-Level Subpopulations

Class- and student-level analyses use information from question 24 of the SASS Teacher Questionnaire, which asked departmentalized teachers to report the subject name, subject-matter code, grade level code, and number of students for each class period or section instructed. Teachers were able to report a maximum of 10 classes.[11] Both the class- and student-level measures consider all classes taught by a teacher, not just classes within a teacher's reported main assignment.

The class-level analysis (table 5) presents the percentage of grade 9−12 classes taught by traditional public and public charter school teachers of departmentalized classes who held various combinations of majors and certifications. The class-level analysis accounts for the variation in the number of classes taught by teachers. The student-level measure (table 6) examines the percentage of students in grade 9−12 classes taught by public school teachers of departmentalized classes who held various combinations of majors and certifications. The student-level findings compensate for variations in the number of classes as well as the number of students in each class instructed by each teacher.

[11] Less than 1 percent of the teachers in this report taught more than 10 classes. However, teachers were only given space on the questionnaire to report the subject area of up to 10 classes. Because the subject area was used to match teacher qualifications, it is not possible to say whether these teachers have in-field qualifications for classes beyond the 10 that were reported. Given the small fraction of teachers who reported more than 10 classes, examining only the first 10 classes reported should not introduce significant bias into the findings.

Teacher-, Class-, and Student-Level Comparisons

Comparing teacher-level results with those from class- and student-level analyses can provide information regarding the percentage of classes or students instructed by teachers with qualifications outside their main assignments, but important distinctions should be considered. Using a hypothetical example, the percentage of teachers who hold in-field qualifications in a particular main assignment may be higher than the percentage of classes taught by teachers who hold in-field qualifications. This result may indicate that some teachers teach subjects outside of their main assignments without in-field qualifications for those subjects or that teachers with in-field qualifications on average instruct fewer classes than teachers without in-field qualifications.

Student-level results (table 6) further explain differences both in the number of classes taught by a teacher and the number of students enrolled in those classes. Using a hypothetical example, the percentage of classes instructed by teachers who hold in-field qualifications could be larger than the percentage of students instructed by teachers who hold in-field qualifications. This would suggest that classes taught by teachers with in-field qualifications are smaller than classes taught by teachers without in-field qualifications. It is important to note that SASS was designed as a representative sample of teachers. Class- and student-level estimates are based on classes and students *taught by teachers* in SASS and may not be nationally representative of classes and students.

Measures: Subjects Taught and Teacher Qualifications

Subjects Taught: Main Assignment and Class Subject Area

For purposes of the analyses presented here, teacher qualifications are considered as they relate to one of two measures of the subjects that teachers instruct: *main assignment* and *course subject area taught*. Each teacher has one main assignment, the field in which he or she reported teaching the most classes. Used for all teacher-level analyses (tables 1–4), the information comes directly from question 16 of the SASS Teacher Questionnaire: "This school year, what is your MAIN teaching assignment field at THIS school? (Your main assignment is the field in which you teach the most classes)."

The class subject area measure includes all subjects (or fields) taught by a teacher. This measure is used for all class- and student-level analyses (tables 5 and 6, respectively). Some teachers may instruct all their classes within their main assignments, and other teachers may instruct one or more classes outside the main

assignments. As noted earlier, detailed information was requested from teachers on up to 10 of the classes they taught in question 24 of the Teacher Questionnaire.

This report examines a selection of 20 main assignment fields and class subject areas, including some subfields of general (i.e., broad) subjects. The broad subject areas are English, mathematics, science, social science, French, German, Latin, Spanish, art/arts and crafts, music, and dance/drama or theater. The reported broad areas and subfields are generally the certification fields and the core subjects of ESEA. No subfields of English and mathematics and not all subfields of science and social science are reported due to a lack of comparability of possible subfields for certification purposes.

Separate foreign languages are broad areas rather than subfields because of the way that state certification standards are set up—each foreign language is considered to be its own content area, and one cannot be substituted for another. That is, a teacher with a Spanish major cannot be certified as a French teacher based on a Spanish major or vice versa. Therefore, each separately coded foreign language has to be treated as a broad subject field rather than as a subfield, in which the broad field of certification can cover a number of subfields that may or may not have separate certification areas recognized by a particular state. There is no general certification content area of "foreign languages." Within these broad subject areas, analyses of subfields are presented in the tables.

The broad subject area of science includes the subfield areas of biology/life sciences and physical science, in which the latter includes further subfields of chemistry, earth sciences, and physics. The broad subject area of social science includes the subfields of economics, geography, government/civics, and history. These 11 broad subject areas and 9 subfield areas represent academic subjects for which clear matches exist between teacher assignment and teacher qualifications. Further, the sample sizes for these subject areas and subfields include sufficient numbers of teachers to support stable estimates.

Teachers of elementary education; special education; English as a Second Language; health education; career and technical education (CTE); driver's education; library or information science; military science or ROTC; philosophy; religious studies; theology or divinity; other foreign languages; and "other" were not examined in this report due to analytical constraints. For example, all of the fields aside from CTE lack a sufficient number of responses for analysis at the high school level. Teachers of CTE subjects often lack any postsecondary degree and may be state-certified by virtue of a postsecondary vocational certificate or vocational work experience.

Prior to matching teacher assignment with qualifications, a typology of subject-matter specialties was determined to classify teachers into various assignment fields. The typology includes main disciplinary fields and certain subfields consistent with previous studies that investigated broad subjects of various disciplinary fields and subfields of science and social science (Ingersoll 1996; Murnane and Schwinden 1989). Subfields are typically separated from the larger disciplinary field for certification purposes and for investigation of teacher demand and quality in the subfields. Although not all states certify science and social science subfields distinctly from the broad fields, to be consistent with previous research and state certification requirements (where implemented), the analyses in this report include the following subfields of science: biology/life sciences and physical science; they also include the following subfields of physical science: chemistry, earth sciences, and physics (Ingersoll 1996; Murnane and Schwinden 1989). The following subfields of social science are also included: economics, geography, government/civics, and history.

The analyses in this report include ESEA core subjects (English, mathematics, science, social science, economics, geography, government/civics, history, foreign language, and arts). When interpreting these results, it is important to note that the law allows states to decide what specific fields should be included under arts and foreign language. This report uses the subjects of French, German, Latin, and Spanish, commonly defined by states as specific fields of "foreign language" and art/arts and crafts, music, and dance/drama or theatre as specific fields of "arts." Generally, English and mathematics are not reported at the subfield levels, not only because there are few comparable certification matches but also because the ESEA list of core subjects does not include subfields for English or mathematics. In fact, the Praxis II test typically includes only one general mathematics test and one English/language arts test that teachers have to pass in order to obtain state certification.

Teacher Qualifications: Major and Certification

This report addresses two primary measures of teacher qualifications—*teacher education* and *teaching certification*—as they relate to the main assignment and course subject area(s) taught. The definition of "in-field" qualifications included in this report is consistent with the definition used in a prior publication analyzing data from the 2007–08 SASS administration (Hill 2011), but it is different from that used in prior publications (Seastrom et al. 2004). Due to differences in the analyses and changes in survey questions, readers are strongly cautioned against making comparisons of estimates in this report and previously published reports based on data from 1999–2000 or earlier

SASS administrations.[12] See appendix D and exhibit D-1 for information on how the matches between subjects taught and teacher qualifications were determined.

Teacher major field of study

The analyses include teachers of all academic backgrounds. The teacher major field of study measure was produced using the educational background items in the SASS Teacher Questionnaire. Teacher education was categorized using two components of teachers' academic majors: the level at which the postsecondary degree was earned and the major field of study.

Teachers satisfied the analytical requirement if they had an in-field degree, whether or not it was awarded by a department, college, or school of education. The measure considered a teacher to have an in-field major if he or she either held at least a bachelor's degree in a major corresponding to the subject of the main assignment (tables 1–4) or held a degree corresponding to the subject of the class areas (tables 5 and 6). The measure considered degrees to be at the bachelor's degree level or higher if they included a first or second bachelor's degree, a first or second master's degree, an educational specialist or professional diploma, a Certificate of Advanced Graduate Studies, or a doctorate or first-professional degree. Of the departmentalized high school teachers, 4 percent reported no applicable degree, 30 percent reported one degree, 42 percent reported two degrees, 19 percent reported three degrees, 4 percent reported four degrees, and less than 1 percent reported five or more degrees. Teachers who did not hold degrees in the subjects they taught were reported as those with majors in other subjects and those whose highest degree was a vocational certificate or associate's degree. The analysis did not include academic minors. However, additional tables that examine teacher qualifications by school and teacher characteristics include academic minor. For more information, see *Supplemental Tables to NCES 2014-059* at http://nces.ed.gov/pubsearch/pubsinfo.asp?pubid=2014059.

Thus, according to the major field of study measure, teachers who reported a main assignment in English, for example, were classified as not holding a degree in the main assignment if they received one or more degrees in any field other than English, but no degree in English; held a vocational certificate or an associate's degree in English or any other subject, but no higher degrees; or held no degree.

[12] Several changes were implemented in the 2003−04 SASS Teacher Questionnaire and carried over into the 2007–08 and 2011–12 administrations. For example, questions used for matching certifications and main assignments were changed after the 1999–2000 administration. All changes are documented in appendix C.

Only a selection of science and social science subfields are presented in this report's tables.[13] However, the estimates for the broad fields of science and social science consider all their subfields. For example, the social science subfields of social studies (general), anthropology, Native American studies, psychology, and sociology are subfields that are not reported in detail, but they are included in the broad field category of "social science." Because all subfields are not reported, the subfield levels do not sum to the totals reported at the broad field level. For example, a teacher with a main assignment of sociology would be included in the broad field of social science and would be considered in-field if the teacher held any of the social science majors.[14] However, sociology is not examined in detail, and therefore, it is not reported in any of the social science subfields.

Teacher certification

Teacher certification status was determined based on three criteria—certification type, content area(s), and grade level(s). The SASS Teacher Questionnaire allows the respondent to report a first and second certification, if applicable, and up to 10 content areas. Analyses considered both first and second teacher certifications.[15] To satisfy the analytical requirements of the teacher certification measure, a teacher must have reported a regular or standard state certification, an advanced professional certificate, or a certificate issued after satisfying all certification requirements except the completion of a probationary period. In addition, the certification must have been granted by, or recognized in, the state in which the teacher currently teaches. Teachers not considered certified were those who reported a certificate that requires some additional coursework, student teaching, or passage of a test before regular certification can be obtained; a certificate issued to persons who must still complete a

[13] Some subfields of science and social science are excluded from the analyses because a substantive match between subject matter, major field of study, and certification area was not possible. That is, comparable codes were not available in each of the three areas. For example, while integrated science was a subject assignment, it was not available as a major or certification. Also, teachers of many of the subfields represented too small a population to achieve stable estimates of teacher qualifications.

[14] Social science subfield majors included anthropology, area or ethnic studies, criminal justice, cultural studies, economics, geography, government/civics, history, international studies, law, Native American studies, political science, psychology, sociology, and other social sciences.

[15] Because SASS collects information on only two certifications, it was not known how many teachers have three or more certifications or the additional fields in which they may be certified. Among the teachers cited in this report, about 19 percent held a second certification. The percentage of teachers with a third or more certifications was likely to be small; hence, potential problems with underestimating the rates of teachers with in-field certifications were likely to be minor. Within the survey question about certifications, SASS allows up to 10 content areas. Of departmentalized high school teachers, 1 percent reported no certification content area, 48 percent reported one content area, 31 percent report two content areas, 10 percent reported three content areas, 5 percent reported four content areas, 4 percent reported five content areas, and less than 2 percent reported six or more content areas.

certification program in order to continue teaching; or no certification in the state in which they teach.

Further, given this report's focus on high school-level teachers, all certificates must apply to at least one of grades 9−12. At the subfield level, some states do not grant secondary-level certifications in all of the subfields examined in this report. As a result, the percentage of in-field certifications in the subfield subject might be underestimated. For this reason, it is important to take both the broad field- and subfield-level findings into account.

Matching Subject Taught and Teacher Qualifications

Matching Process

Teachers not only may teach more than one subject, but also may have earned more than one postsecondary degree and/or more than one certification. The analyses in this report consider a teacher to have an in-field major or in-field certification if the major or certification that the teacher holds matches the subjects taught. Therefore, matches need to be made between the subjects that teachers taught and all the various majors and certifications that teachers held to determine which majors and certifications would be considered "in field". For example, in this analysis, a mathematics teacher is considered to hold a mathematics major if he or she reported any of the following majors: mathematics, computer science, engineering, or physics. See appendix D and exhibit D-1 for information on how the matches between subjects taught and teacher qualifications were determined.

It is particularly important to remember these matching criteria when interpreting results for the broad fields and subfields of science and social science. Teachers who appear in the science or social science rows are not mutually exclusive from teachers who appear in the subfield rows within those subjects. The analyses in the broad field allowed more lenient requirements. For example, a teacher with a main assignment of history appears in the broad social science row and the subfield history row. This teacher is considered to hold an in-field major or certification in the broad field of social science if he or she holds a major or certification in any of the following fields: social studies (general), anthropology, area/ethnic studies, criminal justice, cultural studies, economics, geography, government/civics, history, international studies, law, Native American studies, political science, psychology, sociology, or other social sciences. However, this same teacher must hold a major or a certification in history to be counted as in-field in the specific subfield of history.

The construction of the major field of study and certification measures considered teachers' majors and certifications in several combinations. Taken collectively, qualifications were examined in relation to the subjects that teachers taught (both main assignment and course subject area). While the unit of analysis varies throughout the report, the numerators are based on the number of teachers meeting the specified criteria (in-field major and/or in-field certification), and the denominators are based on all teachers of that subject. In some cases, the unit of analysis is the number of teachers; in others, it is the number of classes or students taught by teachers who meet the specified criteria.

Appendix C—Caution Concerning Changes in Estimates

Readers should be cautious when comparing and interpreting estimates over time. Some of the measured change may not be attributable to a change in the education system but instead to changes in the wording of the questionnaire item. This appendix describes the changes to the Teacher Questionnaires for the 2003–04, 2007–08, and 2011–12 school years.

Changes in the SASS Teacher Questionnaire

The reader should give special attention to changes in the Teacher Questionnaire over time, particularly changes to the 2003−04 questionnaire that were held over to school years 2007–08 and 2011–12. While the current report is similar in content and methodology to previous NCES publications (see Seastrom et al. 2004; Morton et al. 2008; and Hill 2011 for more detailed information), structural changes to the certification items in the school year 2003−04 Teacher Questionnaire could affect the data and result in misleading conclusions.

In the school year 1999–2000 Teacher Questionnaire, respondents reported whether they were certified in their main teaching assignment. The question relied on teachers' self-reporting to match their main assignments to certifications held (see exhibit C-1).

Exhibit C-1.
Main assignment and certification items from the 1999–2000 Public School Teacher Questionnaire

12. THIS school year, what is your MAIN teaching assignment field at this school, that is, the field in which you teach the most classes?

- *Record the assignment field code and the assignment field name from Table 2 on page 14.*
- *If you teach two fields EQUALLY, report one field here and the other in item 15 on page 16.*

0102 ☐☐ Code

5102 _____ Main assignment field

13a. Do you have a teaching certificate in this state in your MAIN teaching assignment field?

0103
1 ☐ Yes
2 ☐ No → *GO TO item 14a on page 16.*

b. What type of certificate do you hold in this field?

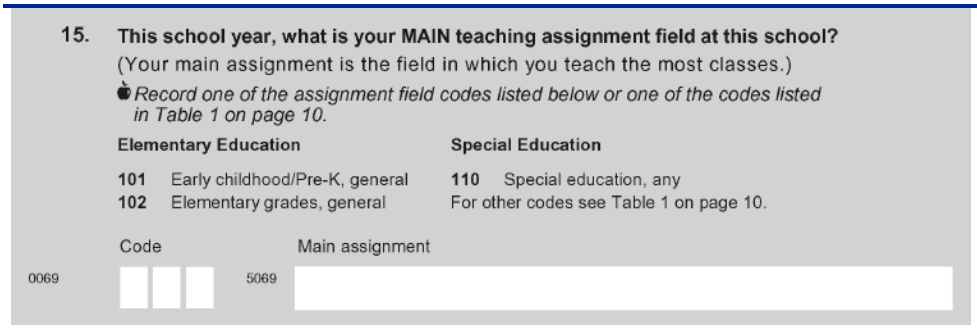
- *Mark (X) only one box.*

0104
1 ☐ Regular or standard state certificate or advanced professional certificate
2 ☐ Probationary certificate (the initial certificate issued after satisfying all requirements except the completion of a probationary period)
3 ☐ Provisional or other type given to persons who are still participating in what the state calls an "alternative certification program"
4 ☐ Temporary certificate (requires some additional college coursework and/or student teaching before regular certification can be obtained)
5 ☐ Emergency certificate or waiver (issued to persons with insufficient teacher preparation who must complete a regular certification program in order to continue teaching)

SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), Public School Teacher Questionnaire, 1999−2000.

In an effort to improve reliability, these items were revised in school year 2003−04. Separate questions asked about main teaching assignment and certification. Respondents were first asked to identify the subject code for their main assignments (exhibit C-2) and then, in a later section of the survey, to identify subject codes for all subjects covered by the certification(s) they held (exhibit C-3). As a result, the determination of whether or not teachers were certified in their main assignments was left to the analyst. Since school year 2003–04, researchers have been able to match the course taught with certification areas, rather than having to rely on teachers' self-matching.

Exhibit C-2.
Main assignment item from the 2003−04 Teacher Questionnaire



15. **This school year, what is your MAIN teaching assignment field at this school?**
(Your main assignment is the field in which you teach the most classes.)

Record one of the assignment field codes listed below or one of the codes listed in Table 1 on page 10.

Elementary Education

101 Early childhood/Pre-K, general
102 Elementary grades, general

Special Education

110 Special education, any

For other codes see Table 1 on page 10.

Code — Main assignment

0069 — 5069

SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), Teacher Questionnaire, 2003−04.

Exhibit C-3.
Certification items from the 2003–04 Teacher Questionnaire

IV CERTIFICATION AND TRAINING

30a. Which of the following describes the teaching certificate you currently hold in this state?

- *Mark (X) only one box.*
- *If you currently hold more than one of the following, a second certification may be listed in item 31.*

0166
1 ☐ Regular or standard state certificate or advanced professional certificate
2 ☐ Probationary certificate (issued after satisfying all requirements except the completion of a probationary period)
3 ☐ Provisional or other type of certificate given to persons who are still participating in what the state calls an "alternative certification program"
4 ☐ Temporary certificate (requires some additional college coursework, student teaching, and/or passage of a test before regular certification can be obtained)
5 ☐ Waiver or emergency certificate (issued to persons with insufficient teacher preparation who must complete a regular certification program in order to continue teaching)
6 ☐ I do not have any of the above certifications in THIS state. → *GO TO item 32 on page 24.*

b. Some certificates may allow you to teach in multiple content areas. In what content area(s) does the teaching certificate marked above allow you to teach in this state?

(For some teachers the content area may be the grade level [e.g., elementary general, secondary general, etc].)

- *Please record the content area code from Table 3 on page 19.*

1) Code 0167 ☐☐☐ **Content Area** 5167

2) Which of the following grade ranges does this certificate apply to?

- *Mark (X) all that apply.*

0168 1 ☐ Elementary grades (including early childhood, preschool and kindergarten)
0169 1 ☐ Secondary grades (including middle school)
0170 1 ☐ Ungraded

c. If there is an additional content area that the certificate described above allows you to teach, please list it below. Otherwise, GO TO item 31a on page 22.

1) Code 0171 ☐☐☐ **Content Area** 5171

2) Which of the following grade ranges does this certificate apply to?

- *Mark (X) all that apply.*

0172 1 ☐ Elementary grades (including early childhood, preschool and kindergarten)
0173 1 ☐ Secondary grades (including middle school)
0174 1 ☐ Ungraded

If there is an additional content area that the certificate described above allows you to teach, please list it in 30d on page 21. Otherwise, GO TO item 31a on page 22.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), Public School Teacher Questionnaire, 2003–04.

While the school year 2007−08 and 2011−12 Teacher Questionnaires follow the same structure as that observed in the school year 2003−04 Teacher Questionnaire, minor wording and formatting changes were implemented. More detail about changes to the 2007−08 Teacher Questionnaire can be found in Hill (2011).

For the school year 2011−12 Teacher Questionnaire, noteworthy revisions include the addition of subject codes and minor changes in the wording of some questions (see exhibit C-4). New subject-matter codes were added to the list of teaching assignments and to the list of majors. For teaching assignments, engineering (214) was added as an option. However, no high school teachers reported engineering as a main assignment; thus, the estimates were not affected. Changes were also made to the list of major fields of study to include social sciences (general) (220) as an option. For this report, a degree in social sciences (general) is considered in-field for teachers with a main assignment in social studies. Less than half of 1 percent of social studies teachers reported a degree in social sciences (general). A complete crosswalk of main assignments, majors, and teaching certification can be found in appendix D.

The teaching certification section had minor changes in wording and in survey design. As shown in exhibit C-4, changes were made both to the wording that asks the respondent to describe the teaching certificate and to the wording that describes the grade range of the certificate.

Exhibit C-4.
Certification items from the 2011–12 Teacher Questionnaire

IV CERTIFICATION

The next series of questions is about state certification. Please read the questions carefully. This section allows teachers to report UP TO TWO current teaching certificates in the state where they are teaching, plus several content areas per certificate, if applicable. Those who have only one certificate that applies to only one content area DO NOT have to fill out the entire section and should follow the GO TO instructions.

37a. Which of the following describes the teaching certificate you currently hold that certifies you to teach in THIS state?

- *Mark (X) only one box.*
- *If you currently hold more than one of the following, a second certification may be listed in item 38.*

0250
1 ☐ Regular or standard state certificate or advanced professional certificate
2 ☐ Certificate issued after satisfying all requirements except the completion of a probationary period
3 ☐ Certificate that requires some additional coursework, student teaching, or passage of a test before regular certification can be obtained
4 ☐ Certificate issued to persons who must complete a certification program in order to continue teaching
5 ☐ I do not hold any of the above certifications in THIS state → *GO TO item 39a on page 26.*

b. Using Table 3 on page 23, in what content area(s) and grade range(s) does the teaching certificate marked above allow you to teach in THIS state?
(For some teachers, the content area may be the grade level, for example, elementary general, secondary general, etc.)

- *If this certificate allows you to teach in more than one content area, you may report additional content areas in later items.*
- *If your certificate does not restrict you to a specific grade range(s), mark all three grade ranges.*

(1) Content Area	(2) Grade Range of Certificate *(mark (X) all that apply)*
0251 Code ☐☐☐ 5251 Content area	0252 ☐ Early childhood, preschool, or at least one of grades K-5 0253 ☐ At least one of grades 6-8 0254 ☐ At least one of grades 9-12

c. Does this certificate marked in item 37a allow you to teach in additional content areas?

0255
1 ☐ Yes → *GO TO item 37d on page 24.*
2 ☐ No → *GO TO item 38a on page 24.*

YOUR COMMENTS

SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), Teacher Questionnaire, 2011–12.

Potential Implications of Changes to SASS

Due to differences in measurement and changes in the analyses, readers are cautioned against making direct comparisons between estimates in this report and previously published estimates based on SASS data from school year 1999−2000 and prior administrations. As discussed in this appendix, several changes were implemented in the school year 2003−04 SASS Teacher Questionnaire and carried over in the school year 2007−08 and 2011−12 SASS. These changes included alterations to the way certifications were matched to main assignments and grade levels from those used in the school year 1999−2000 and prior administrations.

For example, let us assume a hypothetical case of a high school teacher with a main assignment in prealgebra and a certification in "secondary grades, general." In school year 1999−2000, this teacher would have reported a main assignment of mathematics and answered "yes" to the question of being certified in his or her main assignment if the teacher considered the general secondary school certification as applicable. However, the same teacher in school year 2011−12 would not be considered certified in mathematics because only codes for mathematics (190), computer science (197), engineering (214), and physics (217) were valid for a mathematics certification in the analyses of this report.

By contrast, although the subject codes for main assignment and postsecondary majors changed slightly between school years 1999–2000, 2003–04, 2007−08, and 2011−12, the structure of questions related to assignment and postsecondary majors remained the same. Unlike certification, an analysis of majors in relation to assignment is possible, but analysts should be aware of coding changes.

In order to illustrate the changes that could be attributed to changes to the survey, table C-1 provides a comparison of the estimates of the percentage of students taught by grade 9−12 teachers who were certified in the subject being taught, in school years 1999−2000, 2003−04, 2007−08, and 2011−12. Unlike the tables in the main report, table C-1 does not include the secondary-level certification requirement, as information on certification grade level was not collected in school year 1999−2000. Only a subset of those subjects reported in the main text are described in this table. Differences between the 2003−04 and 1999−2000 estimates as well as between the 2007−08 and 2003−04 estimates are also presented in table C-1.

Table C-1.
Among public school students taught by a grade 9–12 teacher, the percentage of students taught by a teacher certified in that subject area, by school year and course subject area: 1999–2000, 2003–04, 2007–08, and 2011–12

	Total certified[1]				Difference between		
Course subject area	1999–2000	2003–04	2007–08	2011–12	2003–04 and 1999–2000	2007–08 and 2003–04	2011–12 and 2007–08
English	85.7	79.5	82.3	82.1	-6.2	2.8	-0.2
Mathematics	83.1	76.8	80.7	81.6	-6.3	3.9	0.9
Science	84.8	80.0	85.4	85.6	-4.8	5.4	0.2
Biology/life sciences	81.9	67.4	77.6	78.4	-14.5	10.2	0.8
Physical science	77.4	59.8	65.7	62.4	-17.6	5.9	-3.3
Chemistry	81.7	61.2	69.9	66.6	-20.5	8.7	-3.3
Earth sciences	59.4	45.5	42.5	52.5	-13.9	-3.0	10.0
Physics	73.7	51.6	63.1	49.2	-22.1	11.5	-13.9
Social science	84.5	81.9	83.6	83.6	-2.6	1.7	0.0

[1] For each course subject area, certifications are in-subject, but not necessarily at the secondary level.

NOTE: This table's estimates are not comparable to those in the body of this report because these estimates do not include the secondary-level certification requirement, as information on certification grade-level was not collected in 1999–2000.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Schools and Staffing Survey (SASS), "Public School Teacher Data File," 2007–08 and 2011–12; Seastrom, M.M., Gruber, K.J., Henke, R., McGrath, D.J., and Cohen, B.A. (2004 rev). *Qualifications of the Public School Teacher Workforce: Prevalence of Out-of-Field Teaching, 1987–88 to 1999–2000* (NCES 2002-603 REVISED); and Morton, B.A., Peltola, P., Hurwitz, M.D., Orlofsky, G.F., and Strizek, G.A. (2008). *Education and Certification Qualifications of Departmentalized Public High School-Level Teachers of Core Subjects: Evidence from the 2003–04 Schools and Staffing Survey* (NCES 2008-338).

It is likely that some of the changes in certification rates from 1999−2000 to 2003−04 were due to changes in the survey, such as separating questions about main teaching assignment and certification. Although the estimates were produced using similar analyses, the estimates differ from the tables in the report which have a stricter definition of in-field teaching. Therefore, readers are cautioned against directly comparing the estimates in this report to those from 1999−2000 and prior years.

Appendix D—Description of Variables

General Table Variables

Teacher level

The SASS restricted-use data files allow users to identify high school teachers in several ways, and readers must give special attention to understanding the meaning of "high school-level teachers" in this analysis, which is a measure of the grade level of students taught by the teacher. This teacher-level measure must be distinguished from the SASS definition of a "high school," which is a measure of the grade level offered at the school. SASS defines a high school as any school in which the lowest grade offered is any of grades 7–12, and the highest grade offered is any of grades 9–12. However, the teacher-level analyses (tables 1–4) of this report define high school-level teachers as those who instruct students in grades 10–12 (and may teach lower grades as well) or grade 9 and no grade lower and are constructed from responses to variables T0070–T0084.[1]

Examination of the correspondence between departmentalized high school-level teachers and teachers in high schools indicated that the large majority of high school-level teachers instruct in schools that meet the SASS definition of a high school. Among departmentalized teachers in high schools (as defined by SASS), 4 percent are middle school-level teachers and 96 percent are high school-level teachers.[2] As a result, about 4 percent of departmentalized teachers (as defined by SASS as high school-level teachers) were dropped from these analyses.

Class and student levels: As with the 2003–04 and 2007–08 questionnaires, the 2011–12 Teacher Questionnaire asked teachers of departmentalized and elementary enrichment classes to report information on up to 10 classes or sections they taught, including the subject, enrollment, and grade level of each class. Classes (table 5) and the students enrolled in them (table 6) were included if taught at the 9–12 grade level.

[1] To maintain consistency with the previous report, the definition of high school-level teachers in this report is consistent with the TEALEV variable from 2007–08. Although TEALEV is not included in the public teacher data file, the same definition was used for this report. The 2011–12 Public School Teacher file contains a new variable (TLEVEL) that defines high school teachers as those with classes in any of grades 9–12, but no lower than grade 9.

[2] The percentages of departmentalized primary school-level and combined school-level teachers are rounded to zero.

Classroom organization: This report includes data on departmentalized teachers—defined as teachers who instruct several classes of different students most or all of the day in one or more subjects. These teachers were selected because they provided extensive details on the classes and students they taught, which allows for analyses that tie specific teachers to specific classes and students. Departmentalized teachers were defined using question 18 (T0092): "Which statement best describes the way YOUR classes at THIS school are organized?"

Main assignment: Tables 1–4 report the qualifications of departmentalized teachers with respect to their main assignments. These tables are constructed using question 16 (T0090): "This school year, what is your MAIN teaching assignment field at THIS school? (Your main assignment is the field in which you teach the most classes.)" Each teacher has one reported main assignment field.

Course subject area(s) taught: Departmentalized teachers are asked to report the subject area of up to 10 classes taught in column B of question 24 in the Teacher Questionnaire (T0110–T00119). These classes make up the course subject(s) taught and were used to construct tables 5 and 6. Course subject area(s) taught include both classes taught within the reported main assignment and in other assignments (where applicable).

Using exhibit D-1, readers are able to crosswalk the majors and certification areas that were matched to the subjects that teachers instructed, either main assignments or course subject areas taught (i.e., the "in-field" qualifications for each subject). In general, the subjects and corresponding "in-field" qualifications included in this report are closely aligned with those in prior NCES publications (Seastrom et al. 2004; Morton et al. 2008; Hill 2011).

Exhibit D-1.
Coding of main assignment or course subject areas, major fields, and certification areas, by subject area: 2011–12

Subject area	Main assignment/ course subject area	Major field	Certification area
English	Communications (151)	Communications (151)	Communications (151)
	Composition (152)	Composition (152)	Composition (152)
	English (153)	English (153)	English (153)
	Journalism (154)	Journalism (154)	Journalism (154)
	Language arts (155)	Language arts (155)	Language arts (155)
	Reading (158)	Linguistics (156)	Reading (158)
	Speech (159)	Literature/literary criticism (157)	Speech (159)
		Reading (158)	
		Speech (159)	
Mathematics	Algebra I (191)	Mathematics (190)	Mathematics (190)
	Algebra II (192)	Computer science (197)	Computer science (197)
	Algebra III (193)	Engineering (214)	Physics (217)
	Basic and general mathematics (194)	Physics (217)	
	Business and applied math (195)		
	Calculus and precalculus (196)		
	Computer science (197)		
	Geometry (198)		
	Prealgebra (199)		
	Statistics and probability (200)		
	Trigonometry (201)		
Science	Science, general (210)	Biology/life sciences (211)	Science, general (210)
	Biology/life sciences (211)	Chemistry (212)	Biology/life sciences (211)
	Chemistry (212)	Earth sciences (213)	Chemistry (212)
	Earth sciences (213)	Engineering (214)	Earth sciences (213)
	Engineering (214)	Physics (217)	Physical science (216)
	Integrated science (215)	Other natural sciences (218)	Physics (217)
	Physical science (216)		Other natural sciences (218)
	Physics (217)		
Biology/life sciences	Biology/life sciences (211)	Biology/life sciences (211)	Biology/life sciences (211)

See notes at end of exhibit.

Exhibit D-1.
Coding of main assignment or course subject areas, major fields, and certification areas, by subject area: 2011–12—Continued

Subject area	Main assignment/ course subject area	Major field	Certification area
Physical science	Chemistry (212) Earth sciences (213) Engineering (214) Integrated science (215) Physical science (216) Physics (217)	Chemistry (212) Earth sciences (213) Engineering (214) Physics (217)	Chemistry (212) Earth sciences (213) Physical science (216) Physics (217)
Chemistry	Chemistry (212)	Chemistry (212)	Chemistry (212)
Earth sciences	Earth sciences (213)	Earth sciences (213)	Earth sciences (213)
Physics	Physics (217)	Engineering (214) Physics (217)	Physics (217)
Social Science	Social studies, general (220) Anthropology (221) Economics (225) Geography (226) Government/civics (227) History (228) Native American studies (231) Psychology (233) Sociology (234)	Social studies, general (220) Anthropology (221) Area/ethnic studies (222) Criminal justice (223) Cultural studies (224) Economics (225) Geography (226) Government/civics (227) History (228) International studies (229) Law (230) Native American studies (231) Political science (232) Psychology (233) Sociology (234) Other social sciences (235)	Social studies, general (220) Anthropology (221) Economics (225) Geography (226) Government/civics (227) History (228) Native American studies (231) Psychology (233) Sociology (234) Other social science (235)
Economics	Economics (225)	Economics (225)	Economics (225)
Geography	Geography (226)	Geography (226)	Geography (226)
Government/civics	Government/civics (227)	Government/civics (227)	Government/civics (227)
History	History (228)	History (228)	History (228)
French	French (171)	French (171)	French (171)
German	German (172)	German (172)	German (172)
Latin	Latin (173)	Latin (173)	Latin (173)

See notes at end of exhibit.

Exhibit D-1.
Coding of main assignment or course subject areas, major fields, and certification areas, by subject area: 2011–12—Continued

Subject area	Main assignment/ course subject area	Major field	Certification area
Spanish	Spanish (174)	Spanish (174)	Spanish (174)
Art/arts or crafts	Art/arts or crafts (141)	Art/arts or crafts (141) Art history (142)	Art/arts or crafts (141)
Music	Music (145)	Music (145)	Music (145)
Dance/Drama or theater	Dance (143) Drama/theatre (144)	Dance (143) Drama/theatre (144)	Dance (143) Drama/theatre (144)

NOTE: Numbers in parentheses correspond to the main assignment and subject matter codes, major field of study codes, and certification content area codes in the 2011–12 SASS Teacher Questionnaire. In the questionnaire, main assignment and subject matter codes can be found on page 11, table 1; major field of study codes can be found on page 15, table 2; and certification content area codes can be found on page 23, table 3.
SOURCE: Graham, S., Parmer, R., Strizek, G., and Thomas, T. (Forthcoming). *Documentation for the 2011–12 Schools and Staffing Survey*. National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC.

The following section describes in detail the analytical requirements for in-field certifications and in-field majors for each main assignment or course subject area.

English teachers: English teachers were those who taught communications, composition, English, journalism, language arts, reading, or speech. In order to have a major in the subject, these teachers were required to hold a major in communications, composition, English, journalism, language arts, linguistics, literature/literary criticism, reading, or speech. English teachers were considered certified in the subject if they reported a certification in communications, composition, English, journalism, language arts, reading, or speech.

Mathematics teachers: Mathematics teachers were those who taught algebra I, algebra II, algebra III, basic and general mathematics, business and applied math, calculus and precalculus, computer science, geometry, prealgebra, statistics and probability, trigonometry, engineering, or physics. In order to have a major in the subject, these teachers were required to hold a major in mathematics, computer science, engineering, or physics. Mathematics teachers were considered certified in the subject if they reported a certification in mathematics, computer science, or physics.

Science teachers: Science teachers are reported in a broad science row in the tables. These science teachers included teachers of science (general), biology/life sciences, chemistry, earth sciences, engineering, integrated science, physical science, or physics. In order to have a major in the subject, these teachers were required to hold a major in biology/life sciences, chemistry, earth sciences, engineering, physics, or other

natural sciences. Science teachers were considered certified in the subject if they reported a certification in science (general), biology/life sciences, chemistry, earth sciences, physical science, physics, or other natural sciences.

Many high school-level science teachers teach specific subfields within the science field. **Biology/life sciences** teachers were required to hold both a major and certification in biology/life sciences. **Physical science** teachers were considered in-field teachers with a major in any of chemistry, earth sciences, engineering, or physics and certification in chemistry, earth science, physical science, or physics.

Within physical science, qualifications were further specified. **Chemistry** and **earth sciences** teachers were required to hold a major and certification in chemistry and earth sciences, respectively. **Physics** teachers were considered to have a major in the subject if they had a major in physics or engineering. They were considered certified in the subject if they held a physics certification. This was done both to account for more specific qualification requirements in some states and to align with the requirements cited in past NCES reports on teacher qualifications (Seastrom et al. 2004; Morton et al. 2008; Hill 2011).

Social science teachers: Social science teachers are reported in a general social science row. These social science teachers included teachers of social studies (general), anthropology, economics, geography, government/civics, history, Native American studies, psychology, or sociology. In order to have a major in the subject, these teachers were required to hold a major in social studies (general), anthropology, area/ethnic studies, criminal justice, cultural studies, economics, geography, government/civics, history, international studies, law, Native American studies, political science, psychology, sociology, or other social science. Social science teachers were considered certified in the subject if they reported a certification in social studies (general), anthropology, economics, geography, government/civics, history, Native American studies, psychology, sociology, or other social science.

Within the individual rows, teachers of the social science subfields of **economics**, **geography**, **government/civics**, and **history** were each held to stricter standards at the subfield level than at the broad field level. At the broad field level, any social science major or certification was considered in-field. However, in order to be considered as having an in-field major and certification, teachers of the social science subfields were required to have a major and certification in the respective subfield (e.g., economics teachers had to earn a major and certification in economics). Again, this was done both to account for more specific qualification requirements in some states and to align with the requirements cited in past NCES reports on teacher qualifications.

Foreign language teacher: In order to meet qualification conditions, **French** teachers were required to hold a major and certification in French. The same requirements were applied to teachers of **German**, **Latin**, and **Spanish**. In order to meet qualifications requirements, foreign language teachers were required to hold a major and certification in their respective foreign language. As mentioned above, teachers of other foreign languages were not included in the tables due to small sample sizes.

Art/arts and crafts teachers: Art/arts and crafts teachers were required to hold a major in art/arts and crafts or art history, and were required to have a certification in art/arts and crafts.

Music teachers: Music teachers were required to hold a major and certification in music.

Dance/drama or theater teachers: Dance/drama or theater teachers were required to hold a major and certification in dance/drama or theater.

Variables Used in the Creation of the Columns

Major field of study: Teachers' major fields of study were calculated using variables T0163 (first bachelor's, first major), T0165 (first bachelor's, second major), T0174 (first master's, major), T0187 (second bachelor's, major), T0190 (second master's, major), T0193 (educational specialist/professional diploma), T0196 (Certificate of Advanced Graduate Studies), and T0199 (doctorate or first professional degree). Codes provided in these variables were matched to teachers' main assignment/subject areas taught and certification areas. Teachers could report up to eight applicable majors. Of departmentalized high school teachers, 4 percent reported no applicable degree, 30 percent reported one degree, 42 percent reported two degrees, 19 percent reported three degrees, 4 percent reported four degrees, and less than 1 percent reported five or more degrees.

Certification type: Certification type was measured using questions 37a (T0250) and 38a (T0275) for the first and, if applicable, second certification held in the state in which teachers currently teach. Teachers were required to hold a regular or standard state certification or advanced certification or a certificate issued after satisfying all requirements except the completion of a probationary period. All other certification types, such as those requiring some additional coursework, student teaching, passage of a test, or completion of a certification program, along with those teachers without a certification, make up the "not-certified" category.

Because SASS collects information on two certifications, it is not known how many teachers have three or more certifications or the additional fields in which they may be certified. About 19 percent of the teachers described in this report held a second certification. It can be surmised that fewer teachers hold three or more certifications. Certainly, having data on three or more certifications would have provided more information on the fields in which a teacher is qualified to teach and would have potentially caused some estimates of the rates of teachers with in-field certifications to increase slightly.

Certification content area: Teachers were asked to report the content area(s) covered by their first and, if applicable, second certification in questions 37b[1]–37d[4] (T0251, T0256, T0260, T0264, and T0268) and 38c[1]–38e[4] (T0277, T0282, T0286, T0290, and T0294). Codes provided in these variables were matched to teachers' main assignment/subject areas taught and majors. Of departmentalized high school teachers, 1 percent reported no certification content area, 48 percent reported one content area, 31 percent report two content areas, 10 percent reported three content areas, 5 percent reported four content areas, 4 percent reported five content areas, and less than 2 percent reported six or more content areas.

Certification grade range(s): The 2011–12 SASS Teacher Questionnaire includes items that measured the grade range(s) for which teachers' certifications applied. This report requires in-field certifications to apply to "At least one of grades 9–12" in the Grade Range of Certificate. The specific questions used are 37b[2], 37d[1], 37d[2], 37d[3], and 37d[4] (T0254, T0259, T0263, T0267, and T0271) for the first certification and 38c[2], 38e[1], 38e[2], 38e[3], and 38e[4] (T0280, T0285, T0289, T0293, and T0297) for the second certification.

Appendix E—Glossary of Terms

Certification: A license or certificate awarded to teachers by the state to teach in a public school. The Schools and Staffing Survey (SASS) includes four types of certification plus the category of "none": a regular or standard state certification or advanced professional certificate; a certificate issued after satisfying all requirements except the completion of a probationary period; a certificate that requires some additional coursework, student teaching, or passage of a test before regular certification can be obtained; and a certificate issued to persons who must complete a certification program in order to continue teaching.

For this report, a certificate is limited to two of the five SASS options. To be precise, a certificate is defined here as a regular or standard state certification, an advanced professional certificate, or a certificate issued after satisfying all requirements except the completion of a probationary period. Certifications must apply to at least one of grades 9−12, except for the subjects of art/arts and crafts, music, and dance/drama or theater, for which an ungraded certification is accepted.

Charter school: See Public charter school.

Common Core of Data (CCD): The CCD is a group of surveys that acquires and maintains public elementary and secondary education data from the 50 states, the District of Columbia, Department of Defense schools, and the outlying areas through state-level (or equivalent) education agencies. Information about staff and students in public schools is collected annually at the school, local education agency (i.e., school district), and state levels. Information about revenues and expenditures is also collected at the state and district levels. The CCD is the basis for the SASS sampling frame for public and public charter schools.

Course subject area taught: This term is not defined in the SASS questionnaires. A general definition is any subject taught by a teacher, including both main assignment and other assignments. Teachers may report multiple subject areas taught.

Departmentalized teacher: The SASS Teacher Questionnaire defines departmentalized teachers as those who instruct several classes of different students most or all of the day in one or more subjects (such as algebra, history, or biology).

In-field teacher: This term is not defined by SASS. In education research literature, an in-field teacher is usually one whose postsecondary degree (major) and/or certification (type or content area covered) match the subject(s) that he or she has been assigned to teach.

Itinerant teacher: See Teacher.

Main assignment field: The SASS Teacher Questionnaire defines main assignment as the field in which the teacher teaches the most classes. Teachers may report only one main assignment.

Major: This term is not defined by SASS, but it is meant as a field of study in which an individual has taken substantial academic coursework, implying that the individual has substantial knowledge of the academic discipline or subject area.

Public charter school: A public charter school is a public school that, in accordance with an enabling state statute, has been granted a charter exempting it from selected state or local rules and regulations. A public charter school may be a newly created school, or it may previously have been a public or private school.

Public school: A public school is an institution or part of an institution that provides classroom instruction to students, has one or more teachers to provide instruction, serves students in one or more of grades 1–12 or the ungraded equivalent, and is located in one or more buildings. It is possible for two or more schools to share the same building; in this case, they are treated as different schools if they have different administrators (i.e., principals). Public schools include regular, special education, vocational/technical, alternative, and public charter schools. Schools in juvenile detention centers and schools located on domestic military bases and operated by the Department of Defense are included. See also entries for Public charter school and Traditional public school.

Regular full-time teacher: See Teacher.

Student enrollment: The number of students officially enrolled in the school or district as of October 1, 2011.

Teacher: A teacher is defined as a full-time or part-time teacher who teaches any regularly scheduled classes in any of grades K–12. This definition includes administrators, librarians, and other professional or support staff members who teach regularly scheduled classes on a part-time basis. Itinerant teachers are included, as well as long-term substitutes who are filling the role of a regular teacher on a long-term basis. An itinerant teacher is defined as a teacher whose assignment requires

teaching at more than one school (e.g., a music teacher who teaches three days per week at one school and two days per week at another). Itinerant teachers who teach full time in any district, but teach part time in a particular school, are considered part-time teachers at that particular school. The definition of a regular full-time teacher does not include any teacher whose primary position in a school is an itinerant teacher, a long-term substitute, a short-term substitute, a student teacher, a teacher aide, an administrator, a library media specialist or librarian, another type of professional staff (e.g., counselor, curriculum coordinator, social worker), support staff (e.g., secretary), or a part-time teacher.

Teacher level: This is based on the grade level of students taught by teachers. Teachers are grouped into four categories based on the grade levels of the students taught and the teachers' main assignments. Teacher level does not necessarily reflect the level of the school in which teachers teach. Using the definition consistent with previous reports (e.g., Hill 2011), high school-level teachers include all teachers who taught any of grades 10–12 (and may have taught lower grades as well), as well as teachers who taught grade 9 and no grade lower. Primary-level teachers include teachers who taught only grades K–4, as well as other teachers who taught grades 5–8 but identified themselves as elementary or special education teachers. Middle-level teachers include teachers who taught students in grades 5–9 and did not teach any students in grades 10–12; some teachers who taught grades 5–8 who identified themselves as elementary or special education teachers were classified as primary-level teachers. All other teachers are categorized as combined.

Traditional public school: Traditional public schools are the subset of all public schools that are not public charter schools. They include regular, special education, vocational/technical, and alternative schools. They also include schools in juvenile detention centers and schools located on domestic military bases and operated by the Department of Defense. See also the definitions for Public school and Public charter school.