Section 4

Contexts of Elementary and Secondary Education
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This List of Indicators includes all the indicators in Section 4 that appear on The Condition of Education web site (http://nces.ed.gov/programs/coe), drawn from the 2000–2004 print volumes. The list is organized by subject area. The indicator numbers and the years in which the indicators were published are not necessarily sequential.
The indicators in this section of *The Condition of Education* measure salient features of schooling and schools. There are 19 indicators in this section: 8, prepared for this year’s volume, appear on the following pages, and all 19, including indicators from previous years, appear on the web (see Web Site Contents on the facing page for a full list of the indicators).

The first feature of schooling and schools is the number and level of academic courses taken by students. The major source of data on these courses used in *The Condition of Education* are high school transcripts, which are collected as part of the National Assessment of Educational Progress (NAEP) and some of the longitudinal surveys conducted by NCES. These transcripts show the numbers of students who took courses at different academic levels in major subject areas of the school curriculum.

Other features include the academic background of teachers and classroom instruction. Two measures considered in *The Condition of Education* are the extent to which students are taught by “out-of-field teachers” (teachers without a major or certification in the subject they teach) and the content of instruction in 8th-grade mathematics and science. The indicators that address the latter measure include results from intensive studies of videotapes of statistically representative samples of science and mathematics classrooms in the United States compared with results from other countries. New indicators on the following pages present findings from a recent video study of science classrooms and compare the extent of out-of-field teaching in high-poverty versus low-poverty schools and high-minority versus low-minority schools.

Another aspect of schooling is the availability of special programs serving the particular educational needs of special populations. Two indicators in *The Condition of Education* address this subject: one on alternative schools and the other on the mainstreaming of students with disabilities. Both of these indicators are on the web.

School choice provides parents with the opportunity to choose a school for their children beyond the assigned school, but there are several different forms of choice. Parents may choose a private school, they may live in a district that offers choice among public schools, or they may select a school by moving into that school’s community. An indicator on the following pages provides information on all three of these aspects of choice.

Another feature of the contexts of elementary and secondary schools is the climate for learning. This climate can be shaped by different factors in the school environment, including the influence of principals, the size of the school, and students’ perception of their physical security and freedom from violence. Indicators in all three areas are included in *The Condition of Education*, both in this volume and on the web.

Other school resources may also come into play. One resource considered in the following pages is “other staff” employed in the schools, which includes guidance counselors and various kinds of instructional aides and specialists.

The indicators on the contexts of elementary and secondary education from previous editions of *The Condition of Education*, which are not included in this volume, are available at http://nces.ed.gov/programs/coe/list/i4.asp.
Coursetakting and Standards

Trends in Science and Mathematics Coursetakting

The percentage of high school graduates who had completed advanced courses in science and mathematics increased between 1982 and 2000.

Student achievement is related to the academic level of coursework that students complete, controlling for various school and background factors (Chaney, Burgdorf, and Atash 1997; Berends, Lucas, and Briggs forthcoming). This indicator shows the trends between 1982 and 2000 in the highest level of science and mathematics coursework that high school graduates completed. This indicator can be viewed only as a proxy measure of change in student coursework because the content and instructional methods of high school courses with similar descriptions can vary across classes and schools, as well as over time.

Since the early 1980s, when states began to increase the number of required courses to receive a high school diploma (NCES 95–029, table 151), the percentage of high school graduates completing advanced coursework in science and mathematics has increased. In 1982, 35 percent of high school graduates had completed advanced science coursework (i.e., at least one course classified as more challenging than general biology); this percentage had increased to 63 percent by 2000 (see supplemental table 21-1). Most of this increase is attributable to increases in the rates at which graduates completed chemistry I and/or physics I because the percentage who had completed at least one course of either chemistry II, physics II, or advanced biology increased only from 15 to 18 percent between 1982 and 2000.

The percentage of high school graduates who had completed courses in advanced academic mathematics (i.e., completed at least one course classified as more challenging than algebra II and geometry I) increased from 26 percent in 1982 to 45 percent in 2000 (see supplemental table 21-2). Moreover, the percentage who had completed advanced level II (i.e., precalculus or an introduction to analysis) more than tripled (from 5 to 18 percent). The percentage who had completed advanced level III (i.e., a course in calculus) doubled (from 6 to 13 percent).

NOTE: Not displayed are the percentages of graduates who completed no or low academic science and mathematics courses. See supplemental note 6 for details on the science and mathematics coursework levels. See supplemental note 3 for more information on the High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80) and the National Education Longitudinal Study of 1988 (NELS:88). See supplemental note 4 for more information on the National Assessment of Educational Progress (NAEP).


FOR MORE INFORMATION:
Supplemental Notes 3, 4, 6
Supplemental Tables 21-1, 21-2
NCES 95–029, 2004–455
Berends, Lucas, and Briggs forthcoming
Chaney, Burgdorf, and Atash 1997
Trends in coursetaking since 1982 indicate that the proportions of high school students completing advanced academic courses in science and mathematics have increased (indicator 21). Unlike measures of total course credits completed in high school, these trends show changes in the academic level of courses completed. These trends, however, do not reveal which students are taking academically challenging courses. This indicator highlights differences among high school graduates in 2000 who completed advanced courses in science and mathematics.

Among 2000 graduates, females were more likely to have completed some advanced science coursework than males. Within the top two levels of advanced science coursetaking, however, the rates at which males and females completed advanced courses were not significantly different from each other (see supplemental table 22-1). Also, the rates at which males and females completed some advanced mathematics courses were not significantly different from each other, but females completed level II advanced academic mathematics courses (i.e., precalculus or an introduction to analysis) at higher rates than males (see supplemental table 22-2).

Asian/Pacific Islanders were more likely than graduates of any other race/ethnicity to have completed advanced science and mathematics courses. Whites were more likely to have completed advanced mathematics courses than Blacks, Hispanics, and American Indians. No measurable differences were found between the rates at which Whites, Blacks, and Hispanics completed advanced science courses.

Private school graduates were more likely than public school graduates to have completed advanced courses in science and mathematics. High school graduates who had completed the Core curriculum or higher were more likely to have completed advanced science and mathematics courses than those who had not completed this curriculum. Among those who had completed the curriculum, however, 20 percent had not completed advanced science courses and 40 percent had not completed advanced mathematics courses.

No differences were detected between the rates at which graduates from small schools (enrollment less than 300), moderate-sized schools (enrollment of 300–999), and large schools (enrollment more than 999) completed advanced courses in science and mathematics.

Differences in coursetaking: Percentage of spring 2000 high school graduates who had completed advanced academic courses in science and mathematics, by selected student and school characteristics

1American Indian includes Alaska Native, Black includes African American, Pacific Islander includes Native Hawaiian, and Hispanic includes Latino. Racial categories exclude Hispanic origin.
NOTE: See supplemental note 6 for details on the science and mathematics coursetaking levels. To meet the requirements of the Core curriculum, students must complete at least 4 years of English and 3 years each of science, mathematics, and social studies. See supplemental note 4 for more information on the National Assessment of Educational Progress (NAEP).

FOR MORE INFORMATION:
Supplemental Notes 4, 6
Supplemental Tables 22-1, 22-2
NCES 2004–455
Learning Opportunities

Instructional Approaches to 8th-Grade Science

The 1999 Third International Mathematics and Science Study included a Videotape Study of 8th-grade science classes in Australia, the Czech Republic, Japan, the Netherlands, and the United States. The study used nationally representative class samples to examine the differences and similarities in how science is taught. This indicator examines aspects of how teachers organize lessons to support science learning.

Some teachers organize science content to encourage students to make connections among experiences, ideas, and explanations; others present content as facts, definitions, or problem-solving algorithms to be learned. Japanese science lessons were more likely to provide opportunities for 8th-graders to make connections than to focus on facts; Czech, Dutch, and U.S. lessons were more likely to focus on facts than on making connections. No difference was detected in focus among Australian lessons.

One way teachers help students make connections is through hands-on, practical activities.1 Engaging students this way is strongly emphasized in Japanese and U.S. curriculum and standards documents, moderately emphasized in those of Australia and the Netherlands, and minimally emphasized in those of the Czech Republic.2 To some degree the observations of students engaged in practical work in the videotaped lessons appear to correspond with these different curricular emphases.

The percentage of science lessons in which 8th-graders conducted practical activities ranged widely, from 23 percent in the Czech Republic to 74 percent in Australia (see supplemental table 23-1). In 46 percent of U.S. science lessons, students conducted experiments, a greater proportion than in the Czech Republic but a smaller one than in Australia. Lessons also varied in the extent students were engaged in the process of scientific inquiry, from developing a hypothesis, through recording observations, to interpreting data. In 31 percent of U.S. science lessons, 8th-graders were asked to collect and record their observations as data, a greater proportion than in the Czech Republic (8 percent), but a smaller one than in Australia and Japan (62 and 59 percent, respectively). Likewise, students were asked to interpret their data in 31 percent of U.S. science lessons, within the range of 20 to 56 percent in the other countries.

PRACTICAL SCIENTIFIC WORK: Percentage of 8th-grade science lessons with student-conducted experiments or other practical activities, by the percentage of lessons in which students collected and recorded data as part of those activities, by country: 1999

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Reporting standards not met (too few cases).

1Practical activities include both traditional laboratory experiments and other hands-on interactions with objects, such as building models, classifying materials, drawing observations of objects, producing and observing phenomena, or designing and testing technological solutions to problems.

Learning Opportunities

Out-of-Field Teaching by Poverty Concentration and Minority Enrollment

In 1999–2000, high school grade students in high-minority and high-poverty public schools were more often taught English, science, and mathematics by out-of-field teachers than their peers in low-minority and low-poverty public schools.

Some researchers hypothesize that teachers’ subject matter knowledge is associated with learning in the classroom. These researchers have found that students learn more from mathematics teachers who majored in mathematics than from teachers who did not (Goldhaber and Brewer 1997) and more from science and mathematics teachers who studied teaching methods in the subject they teach than from those who did not (Monk 1994; Goldhaber and Brewer 2000). These findings have prompted further examinations of “out-of-field” teachers (i.e., teachers who have neither a major nor certification in the subject they teach). Previous research has found that students in the middle grades are more likely than students in high schools to have out-of-field teachers (see NCES 2003–067, indicator 28). This indicator shows the proportion of middle and high school grade students in high-poverty and high-minority public schools who were taught by out-of-field teachers in selected subjects in 1999–2000.

At the high school grade level, students in high-poverty schools were more likely to be taught English, science, and mathematics by an out-of-field teacher than students in low-poverty schools. The same held true for students in high-minority schools compared with students in low-minority schools. No measurable difference was detected in social studies (see supplemental tables 24-1, 24-2, 24-3, and 24-4).

By contrast, in the middle grades, the only difference detected was that students in low-minority schools were more likely to be taught social studies by an out-of-field teacher than students in high-minority schools (16 vs. 7 percent). There were no other measurable differences detected among students in high-minority and high-poverty public schools and their peers in low-minority and low-poverty public schools in English, science, social studies, and mathematics.

OUT-OF-FIELD TEACHERS: Percentage of public high school students taught selected subjects by teachers without certification or a major in the field they teach, by minority concentration and school poverty: 1999–2000

The data used for this analysis are from a nationally representative sample of full- and part-time teachers rather than of students. Thus, this indicator presents the percentage of the sampled set of middle and high school grade teachers’ students who are in classes with a teacher teaching outside his or her field. For ease of presentation, this percentage will be referred to as the percentage of students who are taught by an out-of-field teacher.

NOTE: Major refers to a teacher’s primary fields of study for a bachelor’s, master’s, doctorate, first-professional, or education specialist degree. Major field can be an academic or education major. “High-minority” refers to schools in which 75 percent or more of their enrollments are minority students; “low-minority” refers to schools with a minority enrollment of less than 10 percent. “High-poverty” refers to a school in which 75 percent or more of students are eligible to participate in the free or reduced-price lunch program, a common proxy measure of poverty; “low-poverty” refers to schools in which less than 10 percent of students are eligible to participate in this program. See supplemental note 1 for more information on poverty.


FOR MORE INFORMATION:
Supplemental Notes 1, 3
Supplemental Tables 24-1, 24-2, 24-3, 24-4
Goldhaber and Brewer 1997, 2000
Monk 1994
School Choice

Parental Choice of Schools

The percentage of children whose parents enrolled them in chosen public schools increased between 1993 and 2003. Differences in parents' choice of public school are related to grade level, region, and race/ethnicity.

Between 1993 and 2003, the percentage of students in grades 1–12 attending a “chosen” public school (a public school other than their assigned public school) increased from 11 to 15 percent, while the percentage attending assigned public schools decreased from 80 to 74 percent (see supplemental table 25-1). The percentages of students attending private schools also increased during this period (0.9 percentage points for private church-related schools and 0.8 percentage points for private not church-related schools); these increases, however, were smaller than the increase in the percentage of students attending chosen public schools. This indicator examines the availability of public school choice programs and the students who attend chosen public schools, as reported by parents.1

When asked whether they could send their child to a chosen public school, the parents of 51 percent of students reported having such a choice (see supplemental table 25-2). Not all students’ parents, however, were equally likely to report that they had this choice. For instance, parents of students in grades 9–12 were more likely to report having choice over their child’s public school than parents of students in grades 1–5 (54 vs. 50 percent). The same was true for parents of students in the West compared with those in the Northeast and South (61 vs. 39 and 47 percent, respectively).

Among students whose parents reported having public school choice, approximately 27 percent attended a chosen public school, while 65 percent attended their assigned school. In addition, students in grades 1–5 were more likely to attend a chosen public school than students in grades 9–12 (30 vs. 25 percent). The same was true for Black students compared with White or Hispanic students (42 vs. 22 and 27 percent, respectively), and for students in the South compared with students in the Midwest (30 vs. 22 percent).

Another way in which parents can choose schools is to move to a neighborhood so that their children can attend a particular school. In 2003, the parents of 24 percent of students reported that they moved to their current neighborhood so that their children could attend their current school (see supplemental table 25-3).

Differences in parental choice: Percentage distribution of students in grades 1–12, by type of school: 1993 and 2003

<table>
<thead>
<tr>
<th>Type of school</th>
<th>1993</th>
<th>2003</th>
<th>Percent point difference</th>
<th>Percent change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public, assigned</td>
<td>79.9</td>
<td>73.9</td>
<td>-6.0</td>
<td>-7.5</td>
</tr>
<tr>
<td>Public, chosen</td>
<td>11.0</td>
<td>15.4</td>
<td>4.4</td>
<td>40.0</td>
</tr>
<tr>
<td>Private, church-related</td>
<td>7.5</td>
<td>8.4</td>
<td>0.9</td>
<td>12.0</td>
</tr>
<tr>
<td>Private, not church-related</td>
<td>1.6</td>
<td>2.4</td>
<td>0.8</td>
<td>50.0</td>
</tr>
</tbody>
</table>

Public school choice programs allow students to enroll in another public school or district outside their attendance area without justification based on special needs. These programs can include within-district or out-of-district schools. Estimates in this indicator are based on parents’ responses and parents may or may not know whether such choice is available.

NOTE: Includes homeschooled students enrolled in public or private schools for 9 or more hours per week. Detail may not sum to totals because of rounding.


FOR MORE INFORMATION:
Supplemental Notes 1, 3
Supplemental Tables 25-1, 25-2, 25-3
NCES 2003-031
Research shows that principals can influence the quality of a school’s educational effort (Tucker and Codding 2002; Chubb and Moe 1990). This indicator examines the distribution of principals by various demographic and professional characteristics, including their perceived influence over issues of school governance, using data collected in 1999–2000.

The majority of principals in U.S. elementary schools are female; the majority of secondary school principals are male. At both levels, principals are most likely to be White and to have a master’s degree, to be between the ages of 50 and 54, and to have taught between 10 and 19 years before becoming a principal, relative to other age and experience groupings, respectively (see supplemental tables 26-1 and 26-2).

At both the elementary and secondary levels, principals in public and private schools differ by their demographic characteristics and teaching experience. At both these levels, private schools were more likely than public schools to have principals age 55 and above and more likely to employ principals with 3 or fewer years of prior teaching experience. Private elementary and secondary school principals are more likely to report a high degree of influence over curriculum and performance standards than their public school counterparts.

Principals’ perceptions of their own influence over a number of school governance functions also vary by the level and control of the school. For example, compared with their public school counterparts, private elementary school principals were more likely to report having a high degree of influence over establishing curriculum (67 vs. 31 percent), setting disciplinary policies (83 vs. 69 percent), and setting performance standards for students (64 vs. 36 percent) (see supplemental table 26-3). For the same governance functions, differences in the same direction were found at the secondary level as well.

What principals do on a daily basis also varies by the level and control of the school. For example, 49 percent of public elementary school principals reported that they supervised and evaluated faculty and staff every day, compared with 32 percent of principals at private elementary schools (see supplemental table 26-4). In addition, 84 percent of public secondary school principals reported that they maintained the physical security of students, faculty, and staff as an everyday professional activity, compared with 69 percent of principals at private secondary schools.

**PRINCIPAL INFLUENCE:** Percentage of principals who reported that they have a high degree of influence over specific school governance functions, by school level and control: 1999–2000

<table>
<thead>
<tr>
<th>Function</th>
<th>Percent</th>
<th>Public</th>
<th>Private</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting performance standards for students</td>
<td>64</td>
<td>36</td>
<td>33</td>
</tr>
<tr>
<td>Establishing curriculum</td>
<td>67</td>
<td>31</td>
<td>33</td>
</tr>
<tr>
<td>Setting disciplinary policy</td>
<td>83</td>
<td>69</td>
<td>66</td>
</tr>
<tr>
<td>Deciding how to spend school budget</td>
<td>66</td>
<td>50</td>
<td>44</td>
</tr>
</tbody>
</table>


In 2002, the National Center for Education Statistics conducted a survey about guidance counseling in public high schools. This indicator draws on the survey’s findings to provide a description of guidance staff and the various goals their programs emphasize.

Among schools included in the survey, there was an average of 284 students for every guidance counselor, including counselors who were employed full and part time (see supplemental table 27-1). This number varied with certain school characteristics. For example, the number of students per counselor increased (from 150 to 365) as school size increased from small (less than 400 students) to very large (2,000 or more students). Schools with the lowest minority enrollment (less than 10 percent) and schools in rural areas had a lower number of students per counselor than did other schools.

The survey asked schools how much their guidance programs emphasize four goals: helping students plan and prepare for their work roles after high school, helping students with personal growth and development, helping students plan and prepare for postsecondary schooling, and helping students with their academic achievement in high school. Among these goals, helping students with their academic achievement was the most emphasized goal at the schools surveyed: 48 percent emphasized this goal foremost (see supplemental table 27-2). In comparison, 26 percent of schools reported that the primary emphasis of their guidance program is to help students plan and prepare for postsecondary schooling, 17 percent to help them with personal growth and development, and 8 percent to help them plan and prepare for their work roles after high school.

The primary emphasis of guidance programs also varied by the characteristics of the school. For example, schools located in a city or urban fringe were more likely than rural schools to make helping students with their academic achievement their primary emphasis. The smallest schools (those with less than 400 students) were more likely than larger schools (those with 1,200 students or more) to report that their primary emphasis was on helping students plan and prepare for postsecondary schooling.

The goals that public high school guidance programs emphasize vary according to school size and location.
In addition to teachers, most public schools have staff who work directly with students and provide various support services. Student support staff, including licensed or certified professionals (e.g., school counselors, social workers, and speech therapists) as well as instructional and noninstructional aides, constituted 16 percent of the nation’s public school staff in 1999 (NCES 2003–060, table 82). This indicator examines the distribution of these staff in regular public schools in the 1999–2000 school year.

At the elementary and secondary level, both the number and availability of full- and part-time student support staff vary widely (see supplemental table 28-1). Public elementary schools had an average of 3.4 special education aides, 1.3 regular Title I aides, 1.2 speech therapists, 1.1 counselors, 0.9 nurses, 0.7 bilingual/ESL teacher aides, and 0.5 social workers per school in the 1999–2000 school year. However, public elementary schools were most likely to have a speech therapist (in 96 percent of schools), followed by a special education aide, nurse, and counselor (in 84, 81, and 79 percent of schools, respectively).

In public secondary schools, there was an average of 3.6 special education aides, 2.6 counselors, 0.9 speech therapists, 0.9 nurses, 0.5 social workers, and 0.5 bilingual/ESL teacher aides working full and part time per school. Public secondary schools were mostly likely to have a counselor (in 98 percent of schools), followed by a special education aide, speech therapist, and nurse (in 86, 83, and 79 percent of schools, respectively).

High-poverty schools had higher average numbers of speech therapists, regular Title I aides, and bilingual aides per school than low-poverty schools, while low-poverty schools had higher average numbers of counselors, psychologists, and special education aides than high-poverty schools (see supplemental table 28-2). However, for most types of support staff, both full- and part-time, high-poverty schools had a lower average number of students per staff member than low-poverty schools. The opposite was true only for the average number of students per counselor: high-poverty schools had a higher number of students per counselor. There was no measurable difference between the average number of students per special education aide in high- and low-poverty schools.