CHAPTER FOUR

Science and Mathematics Courses

Overview

The 2012 National Survey of Science and Mathematics Education collected data on science and mathematics course offerings in the nation's schools. Teachers provided information about time spent in elementary science and mathematics instruction, titles and duration of secondary science and mathematics courses, class sizes, gender and racial/ethnic composition, and prior achievement levels. These data are presented in the following sections.

Time Spent in Elementary Science and Mathematics Instruction

Self-contained elementary teachers were asked how often they teach science and/or mathematics. As can be seen in Table 4.1, mathematics is taught in nearly all classes on most or all school days in both grades K–3 and 4–6. In contrast, science is taught less frequently, with only 20 percent of grades K–3 classes and 35 percent of grades 4–6 classes receiving science instruction all or most days, every week of the school year. Many elementary classes receive science instruction only a few days a week or during some weeks of the year.

Table 4.1
Frequency with Which Self-Contained Elementary Classes
Receive Science and Mathematics Instruction, by Subject

| | Percent of Classes | |
	Science	Mathematics
Grades K–3		
All/Most days, every week	20 (1.5)	99 (0.4)
Three or fewer days, every week	39 (1.5)	1 (0.3)
Some weeks, but not every week	41 (1.9)	1 (0.3)
Grades 4–6		
All/Most days, every week	35 (2.6)	98 (0.9)
Three or fewer days, every week	33 (2.6)	2 (0.9)
Some weeks, but not every week	32 (2.5)	0 ---[†]

[†] No grades 4–6 teachers in the sample selected this response option. Thus, it is not possible to calculate the standard error of this estimate.

The survey also asked the approximate number of minutes typically spent teaching mathematics, reading/language arts, science, and social studies in self-contained classes. The average number of minutes per day typically spent on instruction in each subject in grades K–3 and 4–6 is shown in Table 4.2; to facilitate comparisons among the subject areas, only teachers who teach all four of these subjects to one class of students are included in this analysis. In 2012, grade K–3 self-

contained classes spent an average of 89 minutes per day on reading instruction and 54 minutes on mathematics instruction, compared to only 19 minutes on science and 16 minutes on social studies instruction. The pattern in grades 4–6 is similar, with 83 minutes per day devoted to reading, 61 minutes to mathematics, 24 minutes to science, and 21 minutes to social studies instruction. (Note: There are no substantive differences in instructional time on these subjects by the various equity factors; see Appendix F.)

Table 4.2
Average Number of Minutes per Day Spent
Teaching Each Subject in Self-Contained Classes,[†] by Grades

	Number of Minutes	
	Grades K–3	Grades 4–6
Reading/Language Arts	89 (1.7)	83 (2.2)
Mathematics	54 (1.0)	61 (1.4)
Science	19 (0.5)	24 (0.9)
Social Studies	16 (0.4)	21 (0.8)

[†] Only teachers who indicated they teach reading/language arts, mathematics, science, and
    social studies to one class of students were included in these analyses.

Science and Mathematics Course Offerings

Middle and high schools in the sample were given a list of science and mathematics courses and asked to specify the number of sections of each course offered in the school. Respondents were also asked about opportunities provided to students to take courses not offered on site such as through telecommunications or at another school.

Middle schools were asked whether they offered single-discipline science courses (e.g., life science, physical science), coordinated/integrated science courses, or both in each grade 6–8 contained in the school. As can be seen in Table 4.3, 45 percent of schools containing 6th grade offer only coordinated/integrated science, and 36 percent offer only single-discipline courses; this pattern is reversed in grades 7 and 8. Fewer than 1 in 5 schools containing these grades offer both types of courses.

Table 4.3
Type of Middle School Science Courses Offered, by Grade

	Percent of Schools		
	Grade 6	Grade 7	Grade 8
Single-Discipline Science Courses Only	36 (3.6)	46 (3.8)	47 (3.8)
Coordinated or Integrated Science Courses Only	45 (4.1)	38 (3.7)	36 (3.7)
Both	19 (3.5)	15 (3.6)	18 (3.5)

Table 4.4 shows courses offered in high schools. Almost all (98 percent) schools with grades 9–12 offer courses in biology/life science, with 73 percent offering non-college prep courses, 89 percent offering 1st year college preparatory courses, and 64 percent offering at least one 2nd year

biology/life science course. Overall, 94 percent of high schools offer some form of chemistry course. First-year college-preparatory chemistry courses are offered in 85 percent, and 2nd year chemistry in 44 percent of high schools. Most high schools (85 percent) offer physics courses. About three-fourths offer 1st year physics, and one-third offer 2nd year physics. Fewer high schools offer coursework in coordinated/integrated science (68 percent), environmental science (48 percent) or Earth/space science (48 percent) than in the other science disciplines. Only four percent of schools offer second-year Earth science courses; 18 percent offer a second course in environmental science. Nearly 1 in 4 high schools offer at least one engineering course; 14 percent offer non-college preparatory and 13 percent offer 1st year college-preparatory engineering courses. Only 5 percent of high schools offer a 2nd year engineering course.

Table 4.4
High Schools Offering Various Science Courses

	Percent of Schools	
Biology/Life Science		
Any level	98	(0.9)
Non-college prep	73	(2.7)
1st year college prep, including honors	89	(1.9)
2nd year advanced	64	(3.4)
Chemistry		
Any level	94	(1.8)
Non-college prep	51	(2.7)
1st year college prep, including honors	85	(2.5)
2nd year advanced	44	(2.6)
Physics		
Any level	85	(1.9)
Non-college prep	37	(2.9)
1st year college prep, including honors	77	(2.5)
2nd year advanced	34	(2.2)
Coordinated or Integrated Science Courses (including General Science and Physical Science)		
Any level	68	(3.2)
Non-college prep	60	(3.2)
College prep, including honors	47	(2.8)
Environmental Science/Ecology		
Any level	48	(3.2)
Non-college prep	31	(2.7)
1st year college prep, including honors	31	(2.4)
2nd year advanced	18	(1.4)
Earth/Space Science		
Any level	48	(2.9)
Non-college prep	41	(2.9)
1st year college prep, including honors	25	(2.2)
2nd year advanced	4	(0.8)
Engineering		
Any level	24	(2.1)
Non-college prep	14	(2.1)
1st year college prep, including honors	13	(1.5)
2nd year advanced	5	(1.1)

Table 4.5 shows the percentage of high schools offering each of the Advanced Placement (AP) science courses and the percentage of grades 9–12 students in the nation at those schools. Biology is the most commonly offered AP course, offered by about 4 in 10 high schools, followed by AP Chemistry which is offered in roughly 1 in 3 schools. AP Physics B is offered in

22 percent of high schools; AP Physics C in only 12 percent of high schools. AP Environmental Science is offered in 17 percent of high schools. That the percentage of high school students with access to each course is much larger than the percentage of schools offering it indicates that larger schools are more likely than smaller schools to offer AP science courses.

Table 4.5
Access to AP Science Courses

	Percent of High Schools Offering	Percent of High School Students with Access
AP Biology	43 (2.8)	74 (1.7)
AP Chemistry	34 (2.3)	67 (1.8)
AP Physics B	22 (1.8)	48 (1.9)
AP Environmental Science	17 (1.3)	38 (2.0)
AP Physics C	12 (1.2)	25 (2.0)

Across the disciplines, 47 percent of high schools offer at least one AP science course, either this year or in alternating years (see Table 4.6). Approximately the same percentage of schools offers 1–4 AP science courses, with about 10 percent of schools in each category. Only 5 percent of schools offer all of the AP science courses.

Table 4.6
Number of AP Science
Courses Offered at High Schools

	Percent of Schools[†]
0 courses	53 (3.1)
1 course	11 (2.1)
2 courses	10 (1.4)
3 courses	11 (1.4)
4 courses	10 (1.2)
5 courses	5 (0.8)

[†] Only schools that responded about each AP science course are included in this analysis.

Table 4.7 shows the average number of AP science courses offered by various equity factors. Not surprisingly, small schools tend to offer fewer AP science courses than large schools. On average, suburban and urban schools offer more AP science courses than rural schools. In addition, schools with higher proportions of students eligible for free/reduced-price lunch offer fewer AP science courses.

Table 4.7
Average Number of AP Science Courses
Offered at High Schools, by Equity Factors

	Average Number of Courses	
Percent of Students in School Eligible for FRL		
Lowest Quartile	2.0	(0.2)
Second Quartile	1.5	(0.3)
Third Quartile	1.1	(0.2)
Highest Quartile	1.1	(0.2)
School Size		
Smallest Schools	0.7	(0.1)
Second Group	1.2	(0.2)
Third Group	2.1	(0.2)
Largest Schools	2.8	(0.2)
Community Type		
Rural	0.7	(0.1)
Suburban	1.7	(0.2)
Urban	1.7	(0.3)

The survey also asked schools about opportunities provided to students to take science and engineering courses not offered on site. As was described previously, 85 percent of high schools offer at least one physics course; a small additional percentage of schools provide students with access to physics, either by offering it in alternative years or by allowing students to take the course off campus (see Table 4.8). Over one-fourth of high schools provide access to concurrent credit/dual enrollment courses—courses that count for high school and college credit. Having students take science and/or engineering courses at a Career and Technical Education Center, at a college/university, or via telecommunications are each opportunities at about 1 in 5 high schools. Fewer than 10 percent of high schools have students take science/engineering courses at another high school.

Table 4.8
Science Programs and Practices
Currently Being Implemented in High Schools

	Percent of Schools	
Physics courses offered this school year or in alternating years, on or off site	88	(2.9)
Concurrent credit/dual enrollment courses offered this school year or in alternating years	28	(2.8)
Students go to a Career and Technical Education Center for science and/or engineering instruction	22	(3.2)
Students go to a college or university for science and/or engineering courses	22	(2.4)
Science and/or engineering courses offered by telecommunications	18	(2.9)
Students go to another K–12 school for science and/or engineering courses	8	(2.5)

In mathematics, middle schools were asked how many 8th grade students would complete Algebra 1 and Geometry prior to 9th grade. As can be seen in Table 4.9, three-fourths of middle schools have had some students complete Algebra 1 and just over one-fourth have had students complete Geometry. Fewer than one-third of middle schools have had 51 percent or more of their students complete Algebra 1; in schools that offer Geometry, only a small percentage of students typically complete the course prior to 9th grade.

Table 4.9
Middle Schools with Various Percentages of 8th Graders
Completing Algebra 1 and Geometry Prior to 9th Grade

	Percent of Schools			
	Algebra 1		Geometry	
0 percent	25	(3.5)	72	(2.5)
1–10 percent	4	(1.0)	13	(1.4)
11–20 percent	10	(1.7)	7	(1.4)
21–30 percent	14	(1.7)	2	(0.5)
31–40 percent	11	(2.4)	3	(1.9)
41–50 percent	9	(2.3)	2	(1.0)
51–60 percent	7	(2.1)	2	(0.9)
61–70 percent	4	(1.5)	0	---[†]
71–80 percent	6	(1.9)	1	(0.5)
81–90 percent	2	(0.9)	0	---[†]
Over 90 percent	9	(1.8)	0	(0.1)

[†] No middle schools in the sample were in this category. Thus, it is not possible to calculate the standard error of this estimate

The data also show that students in high-poverty schools are less likely than students in low-poverty schools to complete either of these courses prior to 9th grade (see Table 4.10). In addition, a smaller proportion of students in rural middle schools complete Algebra 1 than in suburban and urban middle schools.

Table 4.10
Average Percentage of 8th Graders Completing
Algebra I and Geometry Prior to 9th Grade, by Equity Factors

	Percent of 8th Grade Students			
	Algebra 1		Geometry	
Percent of Students in School Eligible for FRL				
Lowest Quartile	46	(6.1)	13	(3.4)
Second Quartile	26	(4.5)	2	(0.6)
Third Quartile	31	(5.9)	2	(0.8)
Highest Quartile	28	(3.9)	6	(1.9)
School Size				
Smallest Schools	33	(4.6)	4	(1.4)
Second Group	34	(4.1)	7	(2.3)
Third Group	39	(4.0)	5	(1.8)
Largest Schools	42	(3.1)	5	(0.7)
Community Type				
Rural	27	(4.4)	3	(1.7)
Suburban	38	(3.2)	5	(1.5)
Urban	42	(4.7)	7	(1.9)
Region				
Midwest	31	(4.4)	4	(1.5)
Northeast	42	(6.2)	7	(2.9)
South	27	(3.4)	4	(1.4)
West	46	(6.3)	6	(2.2)

Table 4.11 shows mathematics courses offered at the high school level. Nearly all high schools offer a first year formal/college-preparatory mathematics course such as Algebra 1 or Integrated Math 1. The vast majority of high schools also offer a second and third year of formal mathematics. Fewer, but still a large majority offer a fourth year of formal mathematics such as Pre-Calculus. About three-fourths of high schools offer mathematics courses that might qualify for college credit such as AP Calculus or AP statistics.

Table 4.11
High Schools Offering Various Mathematics Courses

	Percent of Schools
Non-college prep (e.g., Remedial Math, General Math, Consumer Math)	78 (3.2)
Formal/College-prep Level 1 (e.g., Algebra 1, Integrated Math 1)	99 (0.7)
Formal/College-prep Level 2 (e.g., Geometry, Integrated Math 2)	90 (3.7)
Formal/College-prep Level 3 (e.g., Algebra 2, Algebra and Trigonometry)	94 (3.5)
Formal/College-prep Level 4 (e.g., Pre-Calculus, Algebra 3)	85 (3.8)
Courses that might qualify for college credit (e.g., AP Calculus, AP Statistics)	76 (4.0)

As can be seen in Table 4.12, just over half of high schools offer AP Calculus AB. AP Calculus BC and AP Statistics are each offered by about one-fourth of high schools. As was the case in science, AP mathematics courses are more likely to be offered in larger schools as the percentage of grades 9–12 students with access to each course is substantially greater than the percentage of schools offering it.

Table 4.12
Access to AP Mathematics Courses

	Percent of High Schools Offering	Percent of High School Students with Access
AP Calculus AB	52 (3.5)	81 (1.6)
AP Statistics	27 (2.1)	59 (1.9)
AP Calculus BC	23 (2.5)	47 (2.1)

Twenty percent of high schools offer only one AP mathematics course (see Table 4.13). Seventeen percent offer two and 14 percent offer three different AP mathematics courses.

Table 4.13
Number of AP Mathematics
Courses Offered at High Schools

	Percent of Schools[†]
0 courses	49 (3.5)
1 course	20 (2.6)
2 courses	17 (2.7)
3 courses	14 (1.3)

[†]   Only schools that responded about each AP mathematics
      course are included in this analysis.

The data on the number of AP mathematics courses offered crossed by various equity factors follow the same pattern as in science. As can be seen in Table 4.14, small schools tend to offer fewer AP mathematics courses than large schools, and suburban and urban schools offer more AP mathematics courses than rural schools. High-poverty schools offer fewer AP mathematics courses on average than low-poverty schools.

Table 4.14
Average Number of AP Mathematics Courses
Offered at High Schools, by Equity Factors

	Average Number of Courses
Percent of Students in School Eligible for FRL	
Lowest Quartile	1.4 (0.2)
Second Quartile	1.1 (0.2)
Third Quartile	0.8 (0.1)
Highest Quartile	0.7 (0.1)
School Size	
Smallest Schools	0.6 (0.1)
Second Group	0.9 (0.1)
Third Group	1.6 (0.1)
Largest Schools	2.1 (0.1)
Community Type	
Rural	0.6 (0.1)
Suburban	1.2 (0.1)
Urban	1.3 (0.2)
Region	
Midwest	0.8 (0.1)
Northeast	1.3 (0.2)
South	1.0 (0.1)
West	1.0 (0.1)

The mathematics program questionnaire also asked about a number of specific course-taking opportunities provided to students. As can be seen in Table 4.15, 76 percent of high schools offer some form of calculus course, including AP and non-AP calculus courses, and 41 percent offer some form of probability and/or statistics course. Over one-third of high schools offer Algebra 1 as a two-course sequence (e.g., Algebra A and Algebra B). Concurrent credit/dual enrollment courses in mathematics are more common than in science (40 percent vs. 28 percent), as is students taking mathematics courses at a local college or university (31 percent vs. 22 percent). Nearly one-fourth of high schools offer mathematics courses via telecommunications; very few have students take mathematics courses at a Career and Technical Education Centers or at other K–12 schools.

Table 4.15
Mathematics Programs and Practices
Currently Being Implemented in High Schools

	Percent of Schools	
Calculus courses (beyond pre-Calculus) offered this school year or in alternating years, on or off site	76	(3.5)
Probability and/or statistics course offered	41	(3.0)
Concurrent credit/dual enrollment courses offered this school year or in alternating years	40	(3.4)
Algebra 1 course offered over two years or as two separate block courses (e.g., Algebra A and Algebra B)	37	(3.7)
Students go to a college or university for mathematics courses	31	(3.0)
Mathematics courses offered by telecommunications	24	(3.3)
Students go to a Career and Technical Education Center for mathematics instruction	11	(1.6)
Students go to another K–12 school for mathematics courses	5	(2.3)

In addition to obtaining information on school course offerings, the teacher questionnaires asked each science and mathematics teacher for the course type of a randomly selected class. As can be seen in Table 4.16, 24 percent of high school science classes are 1st year college preparatory biology; 1st year chemistry accounts for 17 percent of the classes; and 1st year physics for 10 percent.

Table 4.16
Most Commonly Offered High School Science Courses

	Percent of Classes	
Life Science/Biology		
Non-college prep	8	(0.7)
1st year college prep, including honors	24	(1.3)
2nd year advanced	7	(0.9)
Chemistry		
Non-college prep	3	(0.5)
1st year college prep, including honors	17	(0.8)
2nd year advanced	2	(0.4)
Physics		
Non-college prep	2	(0.4)
1st year college prep, including honors	10	(0.9)
2nd year advanced	2	(0.4)
Earth/Space Science		
Non-college prep	4	(0.6)
1st year college prep, including honors	4	(0.6)
2nd year advanced	0	(0.2)
Environmental Science/Ecology		
Non-college prep	2	(0.4)
1st year college prep, including honors	1	(0.4)
2nd year advanced	2	(0.5)
Coordinated or Integrated Science Courses (including General Science and Physical Science)		
Non-college prep	6	(0.8)
College prep, including honors	5	(0.7)

In mathematics, formal/college-preparatory levels 1, 2, and 3 are the most common; each accounting for 20 percent or more of grades 9–12 mathematics classes. Formal level 4 courses

make up 15 percent of the classes; non-college prep mathematics 13 percent; and courses that might qualify for college credit account for eight percent of classes.

Table 4.17
Most Commonly Offered High School Mathematics Courses

	Percent of Classes
Non-college prep (e.g., Remedial Math, General Math, Consumer Math)	13 (1.0)
Formal/College-prep Level 1 (e.g., Algebra 1, Integrated Math 1)	20 (1.3)
Formal/College-prep Level 2 (e.g., Geometry, Integrated Math 2)	23 (1.2)
Formal/College-prep Level 3 (e.g., Algebra 2, Algebra and Trigonometry)	21 (1.1)
Formal/College-prep Level 4 (e.g., Pre-Calculus, Algebra 3)	15 (1.1)
Courses that might qualify for college credit (e.g., AP Calculus, AP Statistics)	8 (0.7)

Other Characteristics of Science and Mathematics Classes

The 2012 National Survey found that the average size of science and mathematics classes is generally around 21 to 24 students (see Table 4.18). However, as can be seen in Figures 4.1–4.6, averages obscure the wide variation in class sizes. For example, 20 percent of middle grades science classes have 30 or more students.

Table 4.18
Average Class Size, by Subject and Course Type

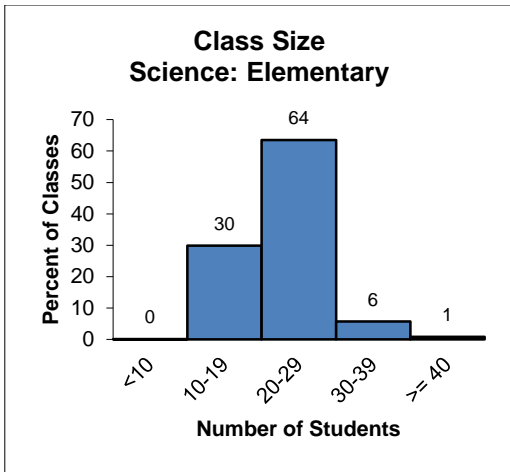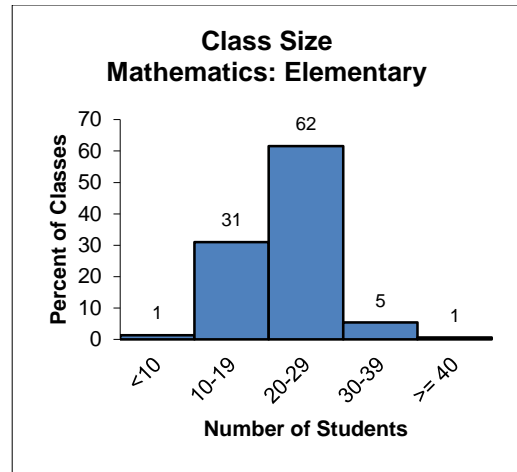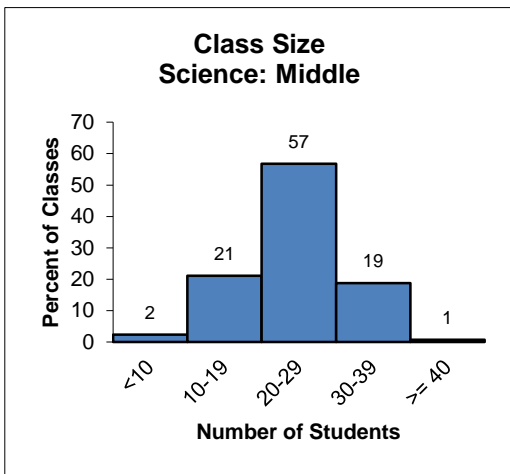|	Average Number of Students	
	Science	Mathematics
Grade Range		
Elementary	21.9 (0.2)	21.4 (0.2)
Middle	23.6 (0.4)	22.1 (0.4)
High	21.7 (0.3)	21.4 (0.3)
High School Science Courses		
Non-college Prep	21.3 (0.5)	— —
1st Year Biology	21.9 (0.7)	— —
1st Year Chemistry	22.3 (0.6)	— —
1st Year Physics	20.5 (1.0)	— —
Advanced Science Courses	18.9 (0.8)	— —
High School Mathematics Courses		
Non-college Prep (e.g., Remedial Math, General Math, Consumer Math)	— —	19.0 (0.7)
Formal/College-prep Level 1 (e.g., Algebra 1, Integrated Math 1)	— —	22.4 (0.5)
Formal/College-prep Level 2 (e.g., Geometry, Integrated Math 2)	— —	22.5 (0.5)
Formal/College-prep Level 3 (e.g., Algebra 2, Algebra and Trigonometry)	— —	21.4 (0.7)
Formal/College-prep Level 4 (e.g., Pre-Calculus, Algebra 3)	— —	21.1 (0.5)
Courses that might qualify for college credit (e.g., AP Calculus, AP Statistics)	— —	18.2 (0.9)

**Class Size
Science: Elementary**

Percent of Classes vs Number of Students:
<10: 0, 10-19: 30, 20-29: 64, 30-39: 6, >= 40: 1

Figure 4.1

**Class Size
Mathematics: Elementary**

Percent of Classes vs Number of Students:
<10: 1, 10-19: 31, 20-29: 62, 30-39: 5, >= 40: 1

Figure 4.4

**Class Size
Science: Middle**

Percent of Classes vs Number of Students:
<10: 2, 10-19: 21, 20-29: 57, 30-39: 19, >= 40: 1

Figure 4.2

**Class Size
Mathematics: Middle**

Percent of Classes vs Number of Students:
<10: 6, 10-19: 24, 20-29: 56, 30-39: 12, >= 40: 1

Figure 4.5

**Class Size
Science: High**

Percent of Classes vs Number of Students:
<10: 7, 10-19: 29, 20-29: 49, 30-39: 14, >= 40: 1

Figure 4.3

**Class Size
Mathematics: High**

Percent of Classes vs Number of Students:
<10: 8, 10-19: 29, 20-29: 48, 30-39: 14, >= 40: 1

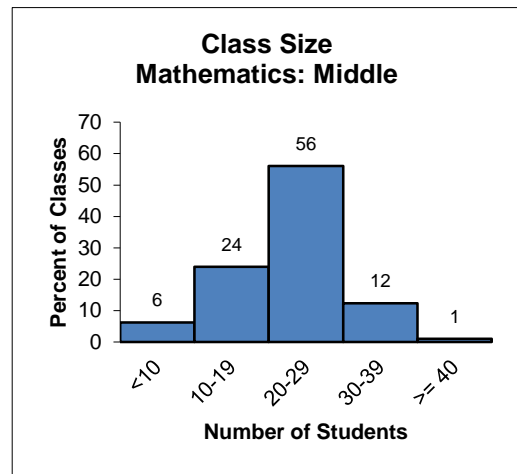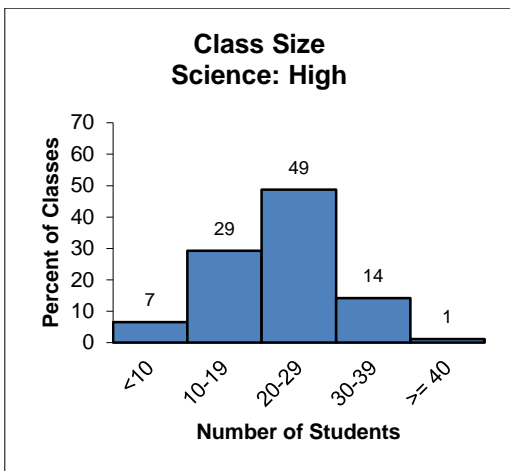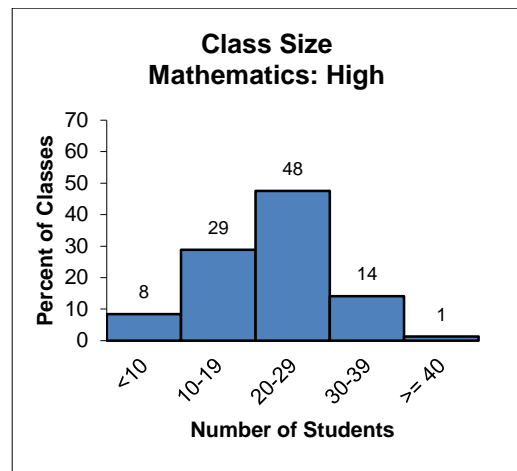*Figure 4.6*

Teachers were asked to indicate the prior achievement level of students in the selected class relative to other students in the school. At the elementary level, 45 percent of science and mathematics classes are heterogeneous in prior achievement; most of the remaining classes are composed primarily of average-achieving students (see Table 4.19). Heterogeneous grouping is less common at the secondary level in both science and mathematics.

Table 4.19
Prior-Achievement Grouping in Classes, by Subject and Grade Range

	Percent of Classes		
	Elementary	**Middle**	**High**
Science Classes			
Mostly low achievers	10 (1.3)	14 (2.0)	13 (1.1)
Mostly average achievers	37 (1.8)	33 (2.0)	30 (1.3)
Mostly high achievers	9 (1.1)	13 (1.6)	28 (1.3)
A mixture of levels	45 (2.0)	39 (2.3)	29 (1.4)
Mathematics Classes			
Mostly low achievers	12 (1.0)	27 (1.8)	24 (1.1)
Mostly average achievers	35 (1.6)	24 (1.8)	28 (1.5)
Mostly high achievers	9 (0.9)	24 (1.7)	26 (1.1)
A mixture of levels	45 (1.5)	26 (1.8)	22 (1.1)

Table 4.20 shows that the use of heterogeneous grouping in high school science classes is similar across courses with the exception of advanced science courses where the percentage drops. Not surprisingly, the percentage of science classes composed mostly of high achievers tends to increase across the traditional course sequence; for example, 28 percent of 1st year chemistry classes consist mostly of high achievers, compared to 48 percent of 1st year physics classes and 67 percent of 2nd year science classes. A similar trend occurs in mathematics, where 29 percent of level 3 classes are composed mostly of high achievers compared to 52 percent of level 4 classes and 74 percent of classes that might qualify for college credit.

Table 4.20
Prior-Achievement Grouping in High School Courses, by Subject

	Percent of Classes			
	Mostly Low Achievers	**Mostly Average Achievers**	**Mostly High Achievers**	**A Mixture of Levels**
Science Courses				
Non-college prep	25 (2.7)	31 (2.3)	10 (1.9)	33 (3.3)
1st Year Biology	16 (2.7)	31 (3.0)	22 (2.9)	31 (3.7)
1st Year Chemistry	6 (1.2)	36 (3.3)	28 (2.6)	30 (2.9)
1st Year Physics	4 (1.8)	19 (2.9)	48 (5.0)	30 (4.2)
Advanced Science Courses	2 (1.2)	14 (3.6)	67 (4.3)	17 (3.3)
Mathematics Classes				
Non-college prep	72 (3.7)	14 (3.4)	2 (1.3)	12 (2.4)
Formal/College-prep Level 1	37 (3.1)	33 (3.2)	6 (1.5)	24 (2.5)
Formal/College-prep Level 2	17 (2.4)	37 (3.4)	21 (2.5)	26 (2.8)
Formal/College-prep Level 3	12 (2.5)	35 (3.3)	29 (2.4)	24 (2.7)
Formal/College-prep Level 4	4 (1.2)	28 (4.1)	52 (4.3)	17 (2.2)
Courses that might qualify for college credit	4 (2.2)	4 (1.8)	74 (5.2)	18 (4.9)

Tables 4.21 and 4.22 show data on prior-achievement grouping by the percentage of non-Asian minority students for science and mathematics classes, respectively. Across all grade levels and in both subjects, classes composed of 40 percent or more of non-Asian minority students are more likely to be classified as consisting of mostly low achievers than classes with smaller proportions of non-Asian minority students. For example, 39 percent of high school mathematics classes with a high percentage of non-Asian minority students are classified as being composed mostly of low achievers, compared to 14 percent of high school mathematics classes with a low percentage of non-Asian minority students.

Table 4.21
Prior-Achievement Grouping in Grade K–12 Science Classes with
Low, Medium, and High Percentages of Non-Asian Minority Students

	Percent of Classes			
	Mostly Low Achievers	Mostly Average Achievers	Mostly High Achievers	A Mixture of Levels
Elementary				
< 10 percent non-Asian minority	6 (2.0)	38 (4.1)	10 (2.8)	46 (4.1)
10–39 percent non-Asian minority	8 (2.7)	38 (3.0)	11 (2.3)	43 (3.5)
≥ 40 percent non-Asian minority	13 (2.0)	36 (2.4)	5 (1.6)	45 (2.7)
Middle				
< 10 percent non-Asian minority	13 (5.3)	37 (4.5)	12 (2.5)	39 (5.3)
10–39 percent non-Asian minority	5 (1.1)	32 (3.4)	19 (3.4)	45 (3.8)
≥ 40 percent non-Asian minority	26 (4.0)	29 (2.5)	9 (1.6)	36 (4.4)
High				
< 10 percent non-Asian minority	6 (1.2)	22 (1.9)	43 (2.4)	29 (2.4)
10–39 percent non-Asian minority	10 (1.4)	31 (2.3)	29 (2.4)	30 (2.3)
≥ 40 percent non-Asian minority	24 (2.9)	33 (2.7)	13 (2.1)	30 (2.6)

Table 4.22
Prior-Achievement Grouping in Grade K–12 Mathematics Classes with
Low, Medium, and High Percentages of Non-Asian Minority Students

	Percent of Classes			
	Mostly Low Achievers	Mostly Average Achievers	Mostly High Achievers	A Mixture of Levels
Elementary				
< 10 percent non-Asian minority	7 (1.7)	41 (3.2)	12 (1.8)	40 (3.2)
10–39 percent non-Asian minority	8 (2.1)	32 (2.6)	9 (1.8)	51 (3.3)
≥ 40 percent non-Asian minority	16 (2.0)	32 (2.6)	7 (1.4)	44 (2.9)
Middle				
< 10 percent non-Asian minority	15 (2.5)	25 (2.8)	31 (3.4)	28 (3.6)
10–39 percent non-Asian minority	17 (2.3)	25 (3.0)	31 (3.4)	26 (2.9)
≥ 40 percent non-Asian minority	43 (4.0)	21 (2.8)	11 (1.9)	25 (2.4)
High				
< 10 percent non-Asian minority	14 (1.7)	30 (3.3)	40 (2.6)	15 (1.9)
10–39 percent non-Asian minority	18 (1.8)	30 (2.5)	26 (1.7)	25 (2.1)
≥ 40 percent non-Asian minority	39 (2.5)	24 (2.7)	12 (1.6)	25 (2.3)

A similar pattern is seen in the class composition data for specific high school courses (see Table 4.23). The percentage of non-Asian minorities trends downward across the progression of science and mathematics courses. For example, 33 percent of students enrolled in 1st year Biology are classified as non-Asian minorities, similar to the overall percentage in high school science classes, compared to only 21 percent in advanced science courses. In mathematics, 39 percent of students in Formal/College-preparatory level 1 courses are non-Asian minorities, while fewer than one-fourth of students in level 4 or above courses are. In terms of gender, females are less likely than males to be enrolled in non-college preparatory science and mathematics classes, and more likely than males to be enrolled in advanced science courses.

Table 4.23
Average Percentages of Female and Non-Asian Minority
Students in Courses, by Grade Range and Course Type

	Science		Mathematics	
	Female	**Non-Asian Minority**	**Female**	**Non-Asian Minority**
Grades				
Elementary	48 (0.5)	39 (1.9)	47 (0.5)	40 (1.5)
Middle	46 (0.7)	36 (1.6)	48 (0.6)	37 (1.8)
High	49 (0.8)	31 (1.2)	48 (0.7)	31 (1.1)
High School Science Courses				
Non-college prep	46 (1.2)	36 (2.3)	— —	— —
1st Year Biology	49 (1.6)	33 (2.7)	— —	— —
1st Year Chemistry	51 (1.4)	30 (1.8)	— —	— —
1st Year Physics	49 (1.8)	23 (2.7)	— —	— —
Advanced Science Courses	54 (1.9)	21 (2.3)	— —	— —
High School Mathematics Courses				
Non-college prep	— —	— —	42 (1.4)	45 (3.3)
Formal/College-prep Level 1	— —	— —	48 (1.1)	39 (2.2)
Formal/College-prep Level 2	— —	— —	50 (1.5)	31 (2.0)
Formal/College-prep Level 3	— —	— —	51 (1.4)	27 (2.3)
Formal/College-prep Level 4	— —	— —	48 (2.1)	22 (2.0)
Courses that might qualify for college credit	— —	— —	48 (1.7)	17 (2.0)

Summary

Data from the 2012 National Survey indicate that in the early grades, mathematics is taught much more frequently than science. Almost all elementary classes spend time on mathematics instruction every school day; in contrast, only 1 in 3 classes in grades 4–6 and 1 in 5 classes in grades K–3 classes receive science instruction every school day. In addition, elementary mathematics lessons tend to be substantially longer than science lessons, although the amount of time devoted to science and mathematics is substantially less than reading/language arts.

In terms of the number of high schools offering various courses, virtually all schools offer at least one biology course, and nearly all offer chemistry; somewhat fewer offer physics. Environmental science and Earth/space science courses are each offered in about half of high schools. In mathematics, although most middle schools offer Algebra 1, relatively few students

complete it prior to 9th grade. At the high school level, almost all schools offer the three-course sequence of Algebra 1, Geometry, and Algebra 2. Nearly as many high schools offer a fourth year in the formal mathematics sequence; three-fourths of high schools offer a calculus course, though only about half offer Advanced Placement Calculus. It is somewhat surprising how few high schools offer science and mathematics courses by telecommunications (18–24 percent), a practice that will surely become more prominent as more states include taking an online class as a graduation requirement.

Advanced Placement courses in science and mathematics are offered in about half of high schools. These courses are less likely to be offered in schools with a high proportion of students eligible for free/reduced-price lunch, and more likely to be offered in large schools. Advanced Placement courses are also more common in suburban and urban schools than in rural schools.

The 2012 National Survey found that the percentage of classes that are heterogeneous in terms of prior achievement declines with increasing grade level. Further, students are assigned to classes that are homogeneous in regards to achievement disproportionally by race; classes with higher proportions of minority students are more likely to be labeled as consisting of "mostly low achievers."

In the sciences, about half of the students in high school biology, chemistry, and physics classes are females, though students in advanced science courses are more likely to be female than male. The proportion of females and males in college preparatory mathematics classes is about equal. Non-Asian minority students make up almost 40 percent of the enrollment in grades K–12, but at the high school level, the proportion of these students decreases as the level of science and mathematics increases.