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Institute of Education Sciences
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The Nation's Report Card

AMERICA'S HIGH SCHOOL GRADUATES

RESULTS FROM THE 2005 NAEP HIGH SCHOOL TRANSCRIPT STUDY

WHAT IS THE HIGH SCHOOL TRANSCRIPT STUDY?

The High School Transcript Study (HSTS) collects and analyzes transcripts from a representative sample of America's public and private high school graduates. The study is designed to inform the public about the types of courses that graduates take during high school, how many credits they earn, and their grade point averages. The HSTS also explores the relationship between coursetaking patterns and student achievement, as measured by the National Assessment of Educational Progress (NAEP). High school transcript studies have been conducted periodically for nearly two decades, permitting the reporting of trends in coursetaking and GPA as well as providing information about recent high school graduates. In addition to collecting transcripts, the HSTS collects student information such as gender, graduation status, and race/ethnicity and information about the schools studied.

WHAT IS THE NATION'S REPORT CARD™?

The Nation's Report Card™ informs the public about the academic achievement of elementary and secondary students in the United States. Report cards communicate the findings of the National Assessment of Educational Progress (NAEP), a continuing and nationally representative measure of achievement in various subjects over time. The Nation's Report Card™ compares performance among states, urban districts, public and private schools, and student demographic groups.

For over three decades, NAEP assessments have been conducted periodically in reading, mathematics, science, writing, history, geography, and other subjects. By making objective information available on student performance at the national, state, and local levels, NAEP is an integral part of our nation's evaluation of the condition and progress of education. Only information related to academic achievement and related variables is collected. The privacy of individual students is protected, and the identities of participating schools are not released. NAEP is a congressionally mandated project of the National Center for Education Statistics (NCES) within the Institute for Education Sciences of the U.S. Department of Education. The Commissioner of Education Statistics is responsible for carrying out the NAEP project. The National Assessment Governing Board oversees and sets policy for NAEP.

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EXECUTIVE SUMMARY

This report presents information about the types of courses 2005 high school graduates took during high school, how many credits they earned, and the grades they received. Information on the relationships between high school records and performance in mathematics and science on the National Assessment of Educational Progress (NAEP) is also included. Transcripts were collected from about 640 public schools and 80 private schools for the 2005 High School Transcript Study (HSTS). These transcripts constituted a nationally representative sample of 26,000 high school graduates, representing approximately 2.7 million 2005 high school graduates. The 2005 results are compared to the results of earlier transcript studies, and differences among graduates by race/ethnicity, gender, and parent education are examined. Because the study is restricted to high school graduates, it contains no information about dropouts, who may differ from graduates. Graduates who receive a special education diploma or certificate of completion are also excluded from analyses in this report unless noted otherwise.

Graduates earn more credits and achieve higher GPAs

- In 2005, graduates earned about three credits more than their 1990 counterparts, or about 360 additional hours of instruction during their high school careers.
- In 2005, the overall grade point average (GPA) was approximately a third of a letter grade higher than in 1990. There are many possible reasons for this apparent increase, including "grade inflation," changes in grading standards and practices, and growth in student performance.

Graduates with stronger academic records obtain higher NAEP scores

- Graduates whose highest mathematics course was geometry or below had average NAEP mathematics scores below the *Basic* achievement level. Graduates who took calculus had average NAEP scores at the *Proficient* level.
- Graduates whose highest science course was chemistry or below had average NAEP science scores below the *Basic* achievement level; those who had completed physics or other advanced science courses had

Defining curriculum levels

Curriculum levels in this report are defined by the number of course credits earned by graduates in specified types of courses during high school, as follows:

STANDARD: At least four credits of English and three each in social studies, mathematics, and science.

MIDLEVEL: In addition to standard, geometry and algebra I or II must be completed; at least two courses in biology, chemistry, and physics; and at least one credit of a foreign language.

RIGOROUS: In addition to midlevel, an additional credit in mathematics including precalculus or higher; biology, chemistry, and physics; and at least three foreign language credits.

average scores at the *Basic* level. Advanced science courses are courses that contain advanced content (like AP biology, IB chemistry, AP physics, etc.) or are considered second-year courses (chemistry II, advanced biology, etc.)

- Graduates who had completed a rigorous curriculum or had GPAs placing them in the top 25 percent of graduates had higher average NAEP scores than other graduates.

Comparisons by gender

- Male and female graduates' GPAs overall and in mathematics and science have increased since 1990. Female graduates' GPAs overall and in mathematics and science were higher than the GPAs of male graduates during each year the HSTS was conducted.
- In 2005, a higher percentage of female than male graduates completed a rigorous or midlevel curriculum, compared to 1990 when there was no significant difference in the percentages of males and females completing at least a midlevel curriculum.
- Among those who have taken higher level mathematics and science courses, male graduates had higher NAEP scores than female graduates. There was no significant difference in scores between males and females who had not taken these higher level courses.

Comparisons by race/ethnicity

- Increased percentages of White, Black, Hispanic, and Asian/Pacific Islander graduates completed at least a midlevel curriculum in 2005 compared with 1990. The GPAs of all four racial/ethnic groups also increased during this time.
- Since 1990, Black graduates have closed a 6 percentage point gap with White graduates in the percentage completing at least a midlevel curriculum; however, the corresponding White-Hispanic gap in 2005 was not significantly different from that in 1990.
- In 2005, both Black and Hispanic graduates were less likely than White graduates to have completed calculus or advanced science courses and to have higher GPAs.

UNDERSTANDING THE RESULTS

Overview of the High School Transcript Study

This report presents information about the types of courses that graduates took during a 4-year high school curriculum, how many credits they earned, and the grades they received. Information on the relationships between high school records and performance in mathematics and science on the National Assessment of Educational Progress (NAEP) is also included. Transcripts were collected from about 640 public schools and 80 private schools for the 2005 High School Transcript Study (HSTS). These transcripts constituted a nationally representative sample of 26,000 public and private high school graduates, representing approximately 2.7 million 2005 high school graduates. The 2005 results are compared to the results of the 1990, 1994, 1998, and 2000 NAEP HSTSs, and differences among graduates by gender, race/ethnicity, and parent education are examined. The sample size was insufficient to permit reliable estimates for American Indian/Alaska Native graduates in 2005.

Standardizing transcript information

Not all high schools have the same standards for course titles, assigning credits, and grade scales. To allow comparisons, HSTS standardizes the transcript information. To control for the variation in course titles, a coding system called the Classification of Secondary School Courses (CSSC) is used for classifying courses on the basis of information available in school catalogs and other information sources. (For more information, see http://nces.ed.gov/surveys/ hst/courses.asp.)

FIGURE 1
Grade point average

in a standard four point scale…	
A	4 points
B	3 points
C	2 points
D	1 point
F	0 points

Course credits are converted to standardized Carnegie units of credits (or Carnegie credits), in which a single unit is equal to 120 hours of classroom time over the course of a year. Schools provided information on how many course credits represent a Carnegie credit at their school. The course credits recorded on the transcript were then converted (standardized) into Carnegie credits for the data analysis for this report.

Points are assigned to each letter grade as shown in figure 1. The points are weighted by the number of Carnegie credits earned, so that a course with 60 hours of instruction counts half as much as one with 120 hours. The average of the points earned for all the courses taken is the grade point average (GPA). Courses in which a graduate did not receive a grade, such as pass/fail and audited courses, do not factor into the GPA calculation. No additional grade points were assigned for Advanced Placement (AP), International Baccalaureate (IB), and other honors classes. This process does not standardize for differences in grading practices among schools and teachers.

Defining curriculum levels

In this report, three curriculum levels are used to report on the coursetaking patterns of graduates: standard, midlevel, and rigorous. The curriculum levels are based on the number of credits and the types of courses graduates completed. For example, a standard curriculum level consists of four credits of English; three credits each of social studies, mathematics, and science; and no foreign language credits. Figure 2 describes the course credits graduates need to complete to be classified at each curriculum level.

FIGURE 2 Course credit requirements to attain specified curriculum levels

	STANDARD	MIDLEVEL	RIGOROUS
ENGLISH	4	4	4
SOCIAL STUDIES	3	3	3
MATHEMATICS	3	3 (including geometry and algebra I or II)	4 (including precalculus or higher)
SCIENCE	3	3 (including at least two of biology, chemistry, and physics)	3 (including biology, chemistry, and physics)
FOREIGN LANGUAGE	0	1	3

NOTE: This is a modified version of curriculum levels used by Laura Horn and Lawrence K. Kojaku (*High School Academic Curriculum and the Persistence Path Through College*, National Center for Education Statistics, NCES 2001–163, U.S. Department of Education, Washington, DC: 2001). The standard curriculum level is equivalent to what Horn and Kojaku refer to as a core curriculum; the nomenclature used in this report is different to avoid confusion with core credits also discussed in this report. One difference between this report and the classification by Horn and Kojaku is that to be considered as having completed a rigorous curriculum, this report does not require graduates to have taken an AP or honors course. This modification was made to ensure that HSTS data for earlier years are consistent with data for 2005.

The NAEP connection

Approximately 17,400 of the graduates included in the transcript study also participated in the NAEP twelfth-grade mathematics or science assessments in 2005. Thus, findings of the HSTS can be linked with NAEP results, allowing a comparison of coursetaking patterns and educational achievement as measured by NAEP.

Caution in interpreting results

The results presented in this report describe information from the collected transcripts and cannot be used to determine the reasons behind these findings. NCES uses widely accepted statistical standards in analyzing data. Unless otherwise noted, the text of this report discusses only findings that are significant at the .05 level. In the tables and charts of this report, the symbol (*) is used to indicate findings that are significantly different from one another. The results in this report are estimates based on samples of students and schools and are therefore subject to sampling and measurement errors.

RECORDS

for 2005 high school graduates show an increase in the number of credits earned, the rigor of the curricula followed, and GPAs compared with those for 1990 graduates.

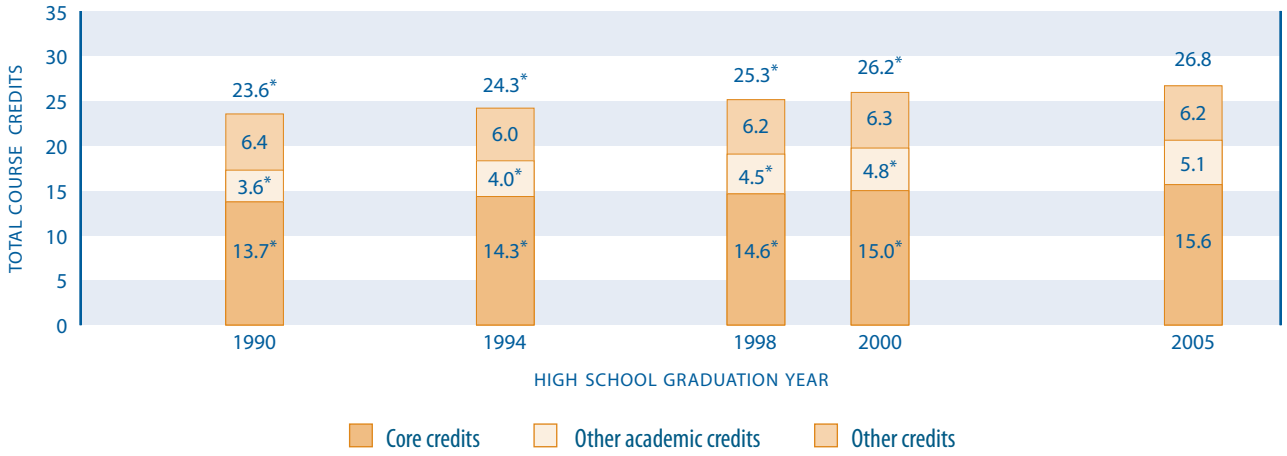
The upward trend in credits and GPA was evident in both core (English, mathematics, science, and social studies) and other academic courses (fine arts, foreign languages, and computer-related studies).

2005 GRADUATES EARN MORE CREDITS THAN PREVIOUS GRADUATION CLASSES

The average number of credits earned by high school graduates has increased over the last 15 years, as seen in figure 3. In 2005, graduates earned over three credits more than 1990 graduates (26.8 in 2005 compared to 23.6 in 1990). Each Carnegie credit represents 120 hours of classroom instruction.

Graduates in 2005 earned almost two credits more in core academic fields than 1990 graduates and approximately one-and-one-half credits more in other academic fields. In other courses, such as vocational education, personal health, and physical education, the total number of credits earned was not higher for 2005 graduates than 1990 graduates.

FIGURE 3 Trends in credits earned, by course types: 1990–2005



*Significantly different (p<.05) from 2005.

NOTE: Details may not sum to total because of rounding. Numbers above the bars represent total credits. Core credits are English, mathematics, science, and social studies. Other academic credits are fine arts, foreign languages, and computer-related studies. Other credits include courses such as vocational education, personal health, and physical education.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2005.

What's behind the upward trend?

The increase in credits earned since 1990 is consistent with data from other NCES transcript studies dating back to 1982 (U.S. Department of Education, various years).

Although average credits earned have increased, the number of school days in the school term and the length of the school day have remained fairly stable during this time. From 1987 to 2004, many states increased the number of credits required in mathematics, science, and social studies

(Council of Chief State School Officers 2004). These increases in the required number of credits needed for graduation may partly explain the upward trend in average course credits taken.

Although it differed from state to state, schools averaged around 1,000 hours per year of instruction time in 2004 or the equivalent of 8.3 Carnegie credits per year. If all instruction time were used solely for courses with credits, over 4 years, graduates would have earned about 33.3 Carnegie credits. Approximately 81 percent of the instruction time was used for credit courses by 2005 graduates versus 71 percent for 1990 graduates (Council of Chief State School Officers 1990).

Graduates consistently earn more credits in English than other core course fields

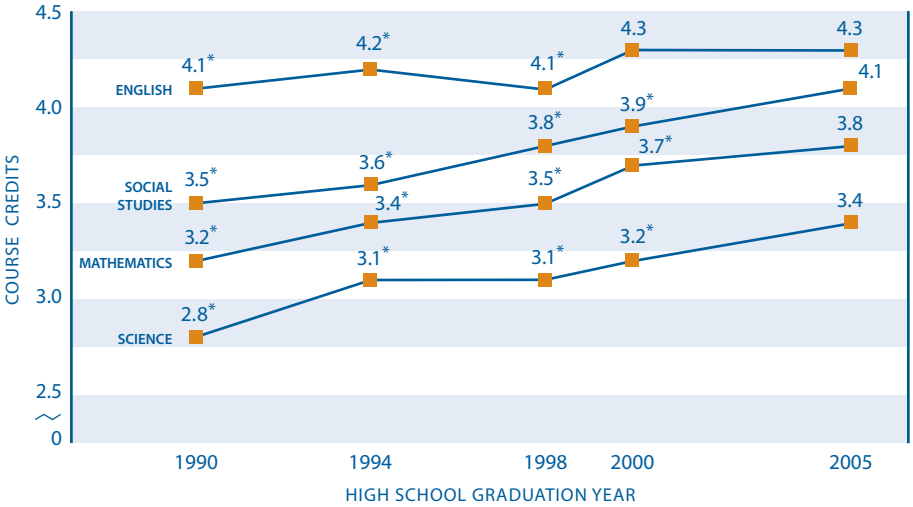
Among the core course fields, graduates consistently earned the most credits in English, as shown in figure 4, followed by social studies, mathematics, and science. Graduates earned almost one credit more in English than in science and half a credit more than in mathematics. In comparison with their 1990 counterparts, the 2005 high school graduates earned more credits in each core course field.

FIGURE 4
Trends in core course fields: 1990–2005

*Significantly different (p<.05) from 2005.

NOTE: Graduates may take more than one course a year in a specific course field. For example, a student may take English IV and also take journalism or creative writing in the same year.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2005.



Which social studies subjects are being taken more frequently?

Social studies consist of a broad range of individual subjects. As shown in table 1, there has not been a significant change in the percentage of graduates who took traditional subjects, such as U.S. history and government/civics/politics compared with 1990. A majority of graduates took these subjects in 1990 and still do in 2005.

However, the percentage of graduates taking courses in world history, world geography, and psychology/sociology in 2005 was greater than in 1990. The course in which there was the largest increase was world history. Three-quarters of graduates in 2005 took at least one world history course, compared with 60 percent in 1990. The percentage of graduates taking world geography increased from 21 percent in 1990 to 31 percent in 2005.

TABLE 1 Percentage of graduates taking social studies: 1990, 2000, and 2005

SUBJECT	1990	2000	2005
U.S. HISTORY	95.6	92.3	94.1
GOVERNMENT/CIVICS/POLITICS	78.9	78.6	79.2
ECONOMICS	48.8	49.8	46.6
WORLD HISTORY	60.1*	69.4*	76.5
WORLD GEOGRAPHY	21.2*	29.3	30.9
PSYCHOLOGY/SOCIOLOGY	33.8*	37.2	37.8

*Significantly different (p<.05) from 2005.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2005.

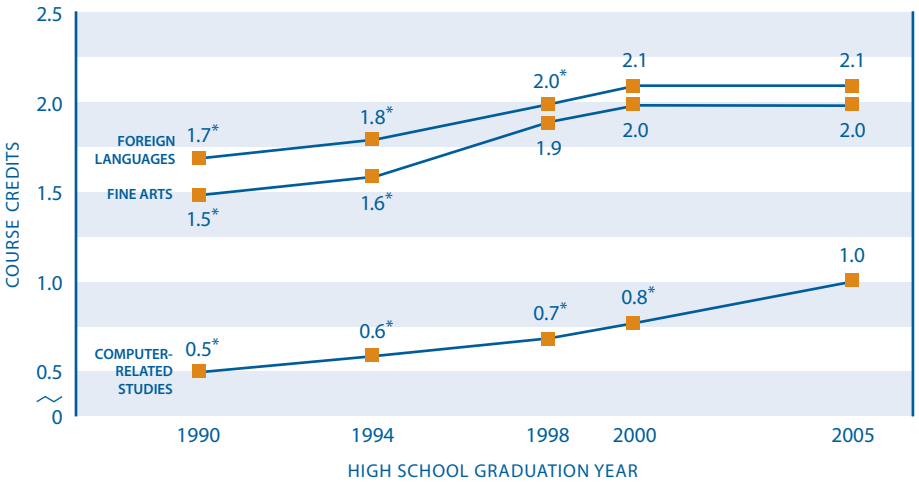
Graduates earn more credits in computer-related studies, fine arts, and foreign languages

As seen in figure 5, high school graduates in 2005 earned about 0.4 credits more than 1990 graduates in foreign languages and 0.5 credits more in fine arts and computer-related studies. Graduates earned more credits in each of these fields in 2005 than in 1990. However, computer-related studies was the only field among the other academic courses to show an increase in the credits earned compared with 2000 graduates.

FIGURE 5
Trends in other academic fields

*Significantly (p<.05) different from 2005.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2005.

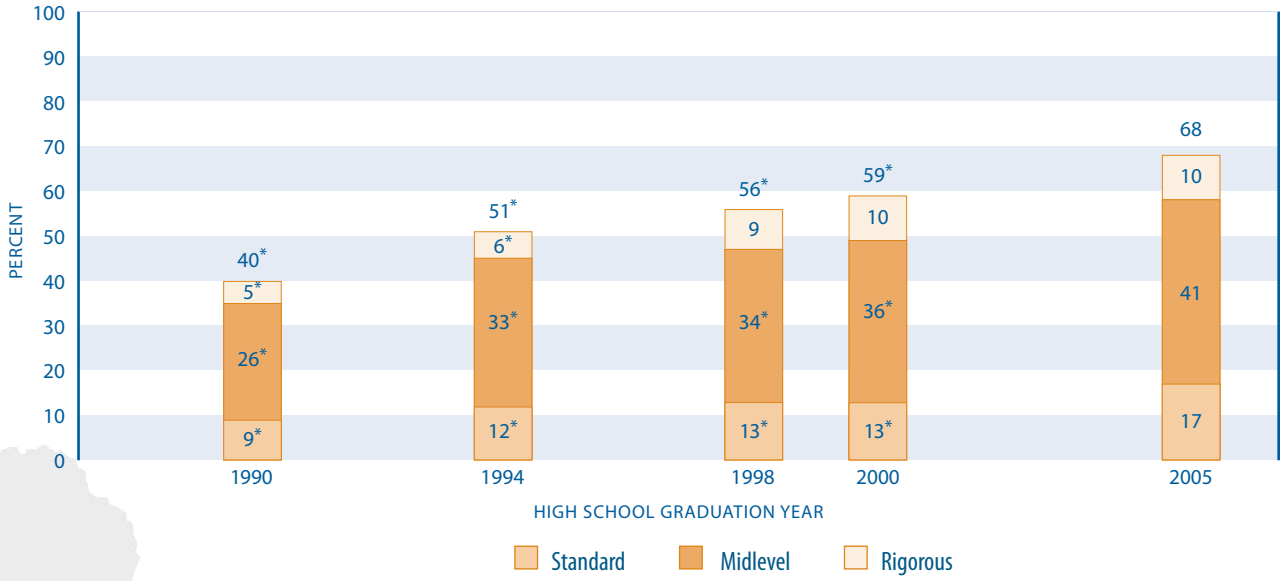


2005 GRADUATES COMPLETE MORE CHALLENGING CURRICULUM LEVELS

More 2005 high school graduates completed a range of higher level courses—such as physics and calculus—during their high school years than had done so in previous years. The rigor of graduates' curriculum levels is an important factor associated with the graduates' entry and success in postsecondary education (Horn and Nuñez 2000).

Figure 6 shows that 68 percent of the 2005 graduates completed a curriculum at or above the standard level—an increase of 28 percentage points over the graduates in 1990. Also, the percentage of graduates completing a rigorous curriculum doubled from 5 percent to 10 percent during the same time period.

FIGURE 6 Trends in curriculum levels: 1990–2005



* Significantly different (p<.05) from 2005.

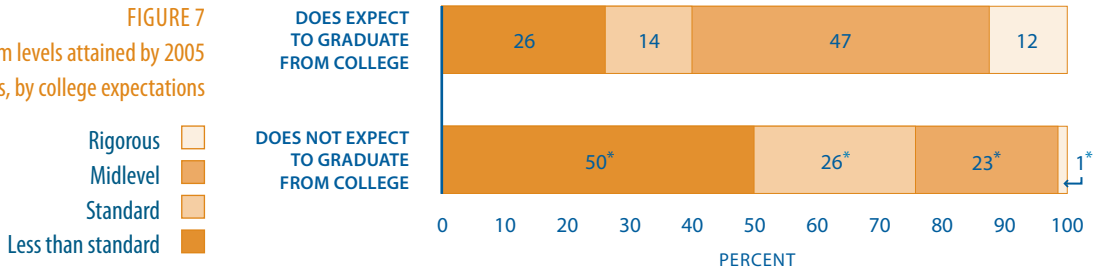
NOTE: Details may not sum to total because of rounding. Numbers above the bars represent the percentage completing at least a standard curriculum.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2005.

High school graduates expecting to graduate from college complete a more challenging curriculum

More than twice as many 2005 high school graduates who expected to graduate from college completed a curriculum at or above midlevel than those who did not expect to graduate from college. Figure 7 indicates that 26 percent of graduates with expectations of graduating from college did not complete at least a standard curriculum.

FIGURE 7
Curriculum levels attained by 2005 graduates, by college expectations



* Significantly different (p<.05) from high school graduates who expect to graduate from college.

NOTE: Details may not sum to total because of rounding.

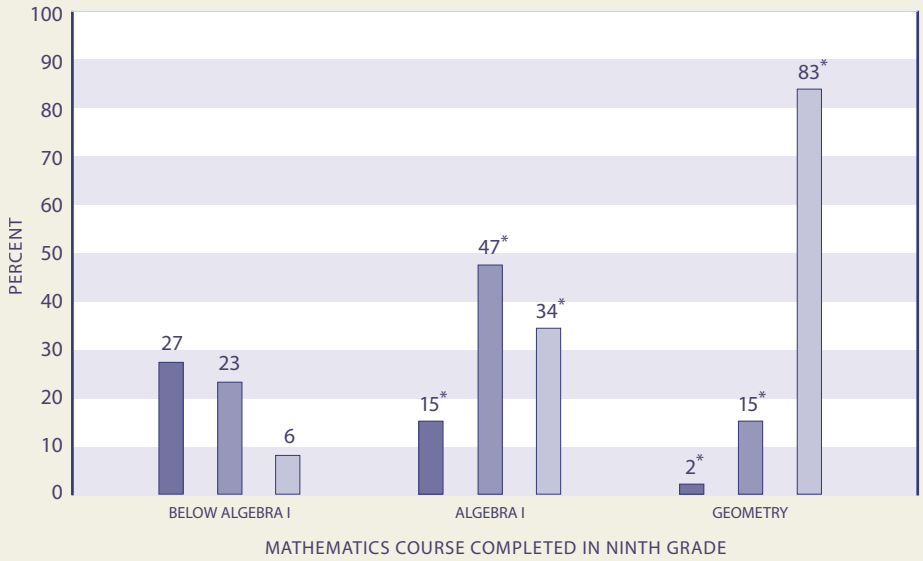
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (2005) and National Assessment of Educational Progress (NAEP) Student Questionnaire (2005).

The pattern for mathematics coursetaking is, in large part, set in the freshman year

The level of mathematics course graduates completed in the ninth grade was a good predictor of the highest level course the graduates completed during high school. Among 2005 graduates, the mathematics course most frequently completed in the ninth grade was algebra I (completed by 57 percent of the graduates). The second most commonly completed course was geometry (completed by 20 percent), followed by below algebra I (completed by 13 percent). An additional 7 percent took a course above geometry (i.e., algebra II, advanced mathematics, or calculus) and 4 percent completed no mathematics course in the ninth grade. Figure 8 shows the highest level mathematics course completed by those graduates who, in the ninth grade, completed one of the three most commonly completed types of mathematics courses.

Among those graduates who took a mathematics course below algebra I in the ninth grade, 6 percent went on to complete calculus or another advanced mathematics course, as shown in figure 8. Among those graduates who had completed algebra I in the ninth grade, 34 percent completed calculus or another advanced mathematics course prior to graduation. Furthermore, the overwhelming majority (83 percent) of those who had completed geometry in the ninth grade went on to complete calculus or another advanced mathematics course. Advanced mathematics includes courses, other than calculus, that are generally taken after algebra II (e.g., AP statistics and precalculus).

FIGURE 8
Highest level mathematics course taken in high school, by mathematics course taken in the ninth grade



* Significantly different (p<.05) from below algebra I.

NOTE: Advanced mathematics includes courses, other than calculus, that are generally taken after algebra II (e.g., AP statistics and precalculus). Graduates completing more than one mathematics courses in the ninth grade are classified by the highest level of the courses completed.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2005.

NOTE: The definitions of advanced mathematics and science used in this report are consistent with those used in the National Education Longitudinal Study and the Education Longitudinal Study except that they include calculus in their advanced mathematics courses, while this report treats calculus as a separate category.

OVERALL GPA CLIMBS

In 2005, high school graduates earned an overall grade point average of 2.98, or about a "B" letter grade. As shown in figure 9, this overall GPA was significantly higher in 2005 than in the previous years. There are many possible reasons for this apparent increase, including "grade inflation," changes in grading standards and practices, and growth in student performance.

There was an increase in average GPA in core courses from 2.47 in 1990 to 2.77 in 2005. This increase of approximately a third of a letter grade is not significantly different from the increases seen for other academic courses and other courses.

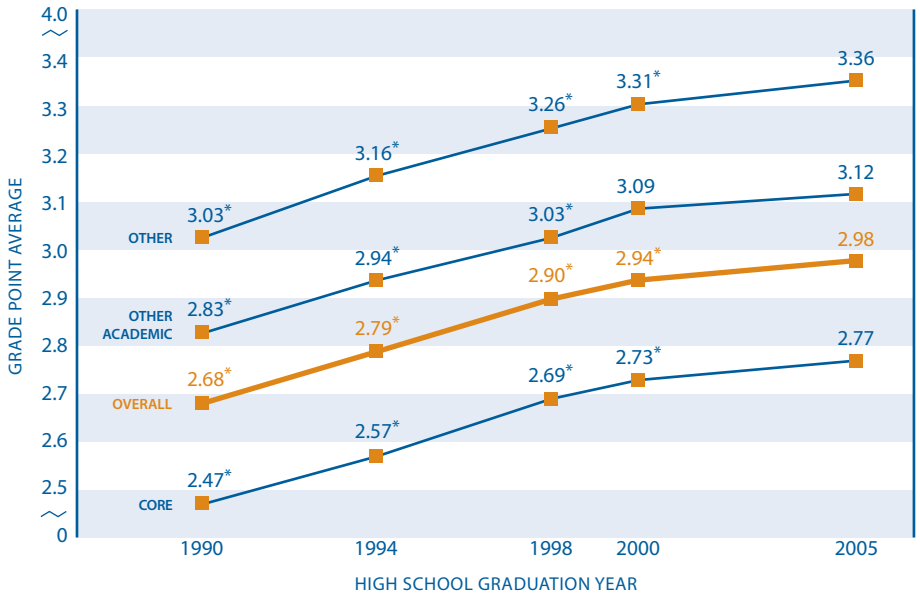
Graduates earned lower GPAs in the core courses than in other academic courses. Graduates earned the highest GPAs in other courses.

FIGURE 9
Trends in GPA: overall and by course type: 1990–2005

*Significantly (p<.05) different from 2005.

NOTE: Core courses are English, mathematics, science, and social studies. Other academic courses are fine arts, foreign languages, and computer-related studies. Other courses include courses such as vocational education, personal health, and physical education.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2005.



2005 graduates have higher GPAs but earn fewer credits in their senior year than earned as underclassmen

During their senior year, 2005 graduates, on average, earned higher GPAs (3.05 compared to 2.96) than they did in earlier years of high school. However, seniors earned fewer credits (6.4 compared with 6.8) than they did as underclassmen. This 0.4 credits difference is equivalent to 48 hours of classroom instruction (HSTS 2005).

Several factors contributed to the higher senior year GPAs. Although not shown here, in addition to taking fewer courses in their senior year, 2005 graduates also took fewer courses in mathematics and science, subjects generally associated with lower grades. Many graduates fulfilled their core requirements in science and mathematics by the time they completed their junior year. In 2005, seniors earned an average of 0.7 credits in mathematics and 0.6 credits in science, compared to the 1.0 credit in mathematics and 0.9 credits in science they had earned annually as underclassmen. Not only did seniors take fewer core courses than in earlier years, but they also earned around 0.3 fewer credits in other academic courses in their senior year than they had as underclassmen. On the other hand, they earned more credits in other courses that are associated with high GPAs.

Curriculum-level profiles

To help in understanding differences in levels of curricula achieved among graduate groups, this section shows the percentage of graduates in each of several groups. For example, 11 percent of White graduates completed a rigorous curriculum compared to 6 percent of Black graduates.

Percentage of graduates completing a rigorous curriculum

- 10 percent of all graduates
- 11 percent of White graduates
  6 percent of Black graduates
  8 percent of Hispanic graduates
  22 percent of Asian/Pacific Islander graduates
- 10 percent male graduates
  11 percent female graduates
- 5 percent with parents who did not graduate from high school
  5 percent with parents who graduated from high school
  8 percent with parents who had some post-high school education
  16 percent with parents who graduated from college
  3 percent did not know parents' educational level
- 26 percent of graduates in the top GPA quartile (3.43–4.00)
  11 percent of graduates in the third GPA quartile (2.98–3.42)
  4 percent of graduates in the second GPA quartile (2.54–2.97)
  1 percent of graduates in the bottom GPA quartile (0.00–2.53)

Percentage of graduates completing a less than standard curriculum

- 32 percent of all graduates
- 31 percent of White graduates
  27 percent of Black graduates
  46 percent of Hispanic graduates
  27 percent of Asian/Pacific Islander graduates
- 36 percent male graduates
  29 percent female graduates
- 43 percent with parents who did not graduate from high school
  34 percent with parents who graduated from high school
  31 percent with parents who had some post-high school education
  24 percent with parents who graduated from college
  48 percent did not know parents' educational level
- 17 percent of graduates in the top GPA quartile (3.43–4.00)
  24 percent of graduates in the third GPA quartile (2.98–3.42)
  38 percent of graduates in the second GPA quartile (2.54–2.97)
  51 percent of graduates in the bottom GPA quartile (0.00–2.53)

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2005.

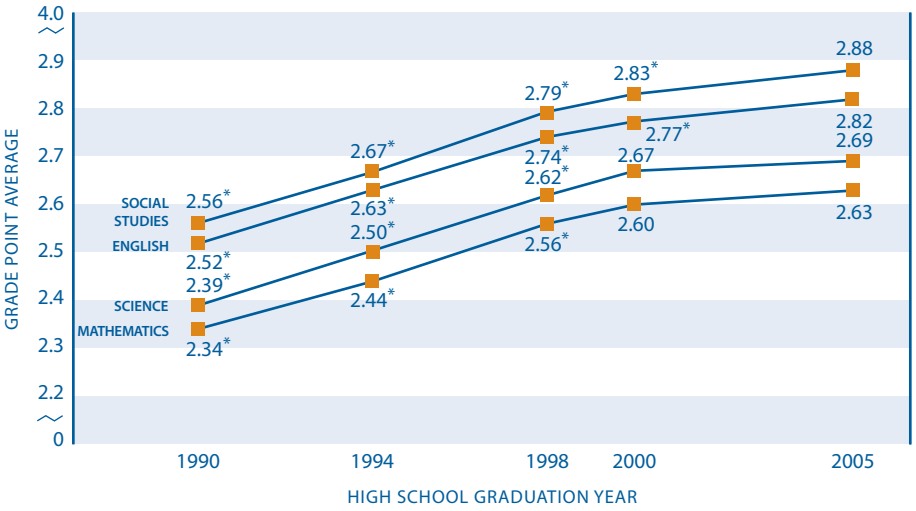
Highest average GPA in core subjects is in social studies

As shown in figure 10, in each year of the transcript study, GPAs in social studies and English were significantly higher than GPAs in science and mathematics. The graduates' GPAs in each core subject in 2005 were higher than in 1990 by about a third of a grade.

FIGURE 10
Trends in GPAs for core course fields: 1990–2005

* Significantly different (p<.05) from 2005.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2005.



NAEP

scores are highest for those graduates completing a more challenging curriculum and higher level mathematics and science courses.

Graduates with a mathematics GPA in the top 25 percent or completing a calculus course reached the *Proficient* level on the NAEP mathematics assessment on average. Graduates with mathematics GPAs in the bottom 25 percent or who completed geometry or below as their highest level mathematics course scored, on average, below the *Basic* level.

UNDERSTANDING NAEP SCORES

National Assessment of Educational Progress achievement levels are performance standards showing what students should know and be able to do. Results are reported as scale scores and percentages of students performing at or above three achievement levels:

- **BASIC:** Denotes partial mastery of the knowledge and skills that are fundamental for proficient work at a given grade.
- **PROFICIENT:** Represents solid academic performance. Students reaching this level have demonstrated competency over challenging subject matter.
- **ADVANCED:** Signifies superior performance.

FIGURE 11
Range of NAEP mathematics and science scores for each NAEP achievement level

ACHIEVEMENT LEVEL	MATHEMATICS SCORES
ADVANCED	216 OR HIGHER
PROFICIENT	176–215
BASIC	141–175

ACHIEVEMENT LEVEL	SCIENCE SCORES
ADVANCED	210 OR HIGHER
PROFICIENT	178–209
BASIC	146–177

The National Assessment Governing Board sets specific achievement levels for each subject area and grade, based on recommendations from panels of educators and members of the public, to provide a context for interpreting student performance on NAEP. As provided by law, NCES, upon review of congressionally mandated evaluations of NAEP, has determined that achievement levels are to be used on a trial basis and should be interpreted with caution. NAEP achievement levels have been widely used by national and state officials. Many consider *Proficient* to be the desired level for all students. Additional information about NAEP achievement levels can be found at http://www.nagb.org/pubs/pubs.html.

The NAEP twelfth-grade mathematics and science results are reported on a 0–300 scale. The ranges of scores that fall within each of the achievement levels are shown in figure 11. Because NAEP scales are developed independently for each subject, scores cannot be used to make comparisons across subjects.

Cautions in interpreting results

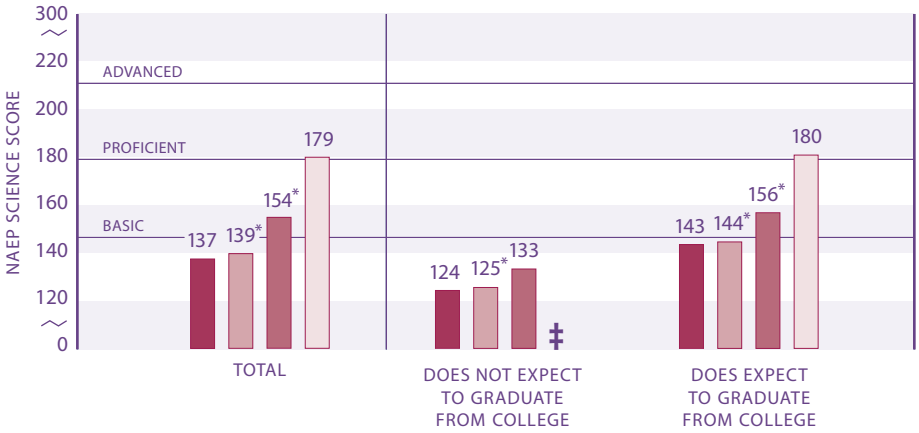
There can be many explanations of an association between NAEP scores and other variables (e.g., curriculum level, average GPA, and highest course taken). HSTS data do not support conclusions about cause and effect between variables. For example, graduates who take a more challenging curriculum score higher on NAEP assessments. This could be because taking a more challenging curriculum provided them with the information they needed to do well on NAEP, or it could be that the best prepared and most motivated students did better on NAEP and chose to take more challenging curricula, or it could be a mixture of these influences and others.

GRADUATES COMPLETING A RIGOROUS CURRICULUM HAVE HIGHER NAEP SCORES

Figure 12 shows that the scores on the science NAEP assessments were higher for those graduates who completed a rigorous curriculum than for those who completed a lower level curriculum.

High school graduates who expected to graduate from college scored higher on the NAEP science assessment than those who did not expect to graduate. Those who completed a less than standard curriculum and expected to graduate from college scored higher on the assessment than graduates who took a midlevel curriculum but did not expect to graduate.

FIGURE 12
NAEP science scores, by curriculum level completed and college expectations: 2005

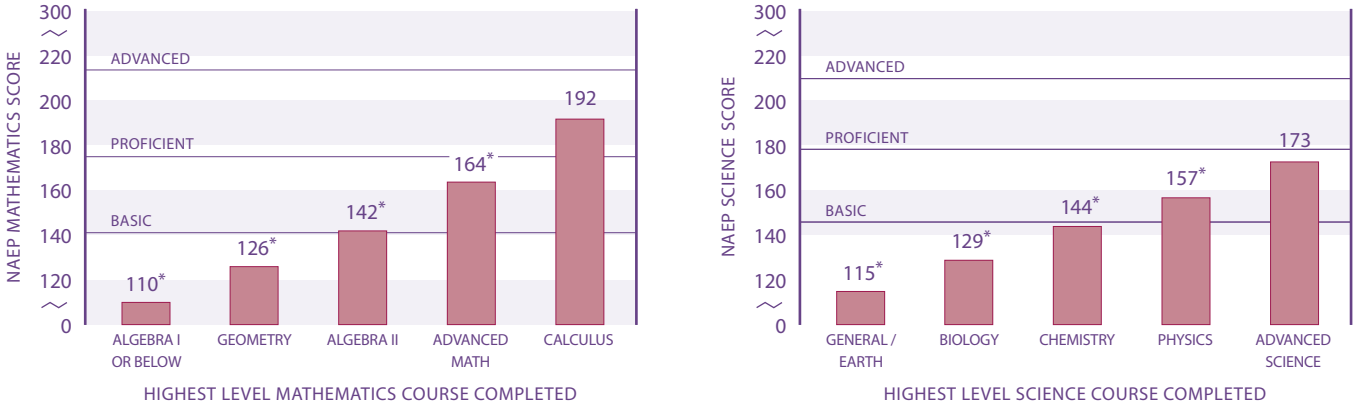


SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (2005) and National Assessment of Educational Progress (NAEP) Student Questionnaire (2005).

Graduates completing higher level mathematics and science courses have higher NAEP scores

As seen in figure 13, NAEP scores are higher for those graduates who completed the most challenging mathematics and science courses. For example, the average NAEP mathematics score among graduates whose highest course was geometry or below fell below the *Basic* achievement

FIGURE 13 NAEP mathematics and science scores, by highest level course taken: 2005



*Significantly different (p<.05) from next highest level course completed.

NOTE: Advanced mathematics includes courses, other than calculus, that are generally taken after algebra II (e.g., AP statistics and precalculus). Advanced science courses are courses that contain advanced content (like AP biology, IB chemistry, AP physics, etc.) or are considered second-year courses (chemistry II, advanced biology, etc.).

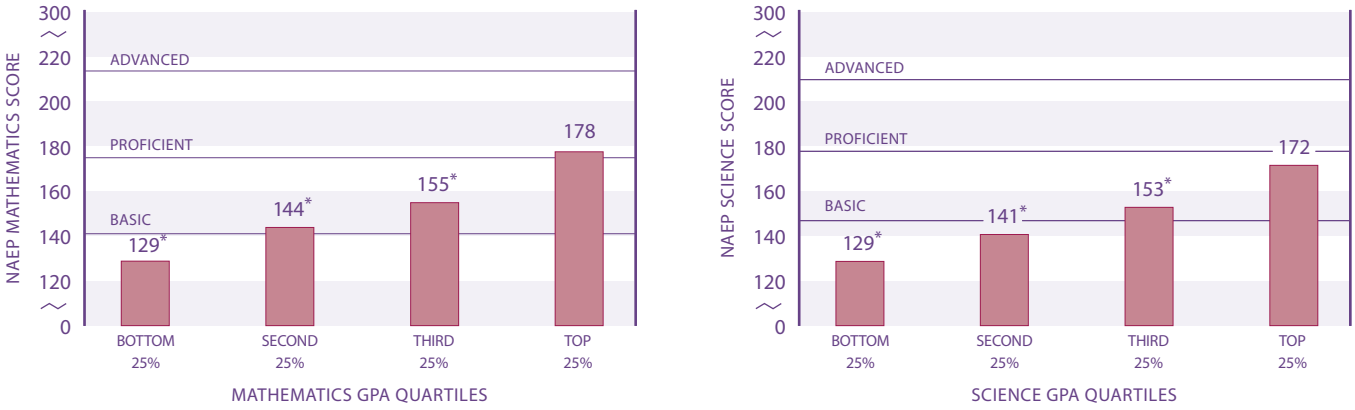
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2005.

level. On the other hand, the average score of graduates who had taken calculus was at the *Proficient* level. Graduates whose highest science class was chemistry or below had an average NAEP science score that placed them below *Basic*. Graduates who completed physics and other advanced science courses had average scores placing them at *Basic*. With each additional course level completed in mathematics or science, the graduate's average score increased.

IN MATHEMATICS AND SCIENCE, HIGHER GPAs ARE ASSOCIATED WITH HIGHER NAEP SCORES

As shown in figure 14, on average, graduates who earned higher GPAs in mathematics courses scored higher on the NAEP mathematics assessment and those earning high GPAs in science had higher NAEP science scores. Scores ranged from an average of 129 for graduates in the bottom 25 percent of mathematics GPAs to 178 for graduates in the top 25 percent. For science, the average scores ranged from 129 for those in the bottom science GPA quartile to 172 for those in the top quartile.

FIGURE 14 NAEP mathematics and science scores, by GPA quartiles: 2005



*Significantly different (p<.05) from next highest quartile.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2005.

ACADEMIC PROFILES AND NAEP SCORES

Academic profiles of 2005 graduates are presented below and average NAEP scores are presented in figure 15. The profiles show the academic characteristics of graduates at a given achievement level. For example, of the graduates who reached the *Advanced* level in mathematics, 88 percent had completed calculus as their highest course. Figure 15 shows the average NAEP scores of graduates with particular academic characteristics. For example, it shows that the average NAEP mathematics score of graduates who took calculus was 192. This average score is at the *Proficient* level, even though some graduates had scores that placed them at a higher or a lower achievement level.

Academic profiles of graduates who scored at the *Advanced* and below the *Basic* achievement levels on NAEP assessments

Mathematics– *Advanced*

- 89 percent had calculus as highest course completed
  - 11 percent had advanced mathematics as highest course completed
  - <1 percent had algebra II as highest course completed
  - <1 percent completed less than algebra II
- 85 percent top 25% mathematics GPA (3.20–4.00)
  - 11 percent 2nd highest 25% mathematics GPA (2.62–3.19)
  - 4 percent 3rd highest 25% mathematics GPA (2.00–2.61)
  - <1 percent bottom 25% mathematics GPA (0.00–1.99)
- 86 percent took AP/IB mathematics course
  - 14 percent did not take AP/IB mathematics course

Mathematics – below *Basic*

- 1 percent had calculus as highest course completed
  - 13 percent had advanced mathematics as highest course completed
  - 43 percent had algebra II as highest course completed
  - 26 percent had geometry as highest course completed
  - 17 percent had algebra I or below as highest course completed
- 7 percent top 25% mathematics GPA (3.20–4.00)
  - 20 percent 2nd highest 25% mathematics GPA (2.62–3.19)
  - 29 percent 3rd highest 25% mathematics GPA (2.00–2.61)
  - 44 percent bottom 25% mathematics GPA (0.00–1.99)
- 1 percent took AP/IB mathematics course
  - 99 percent did not take AP/IB mathematics course

Science– *Advanced*

- 72 percent had advanced science as highest science course completed
  - 23 percent had physics as highest science course completed
  - 4 percent had chemistry as highest science course completed
  - 1 percent had biology as highest science course completed
  - <1 percent completed less than biology
- 81 percent top 25% science GPA (3.27–4.00)
  - 13 percent 2nd highest 25% science GPA (2.67–3.26)
  - 4 percent 3rd highest 25% science GPA (2.00–2.66)
  - 1 percent bottom 25% science GPA (0.00–1.99)
- 61 percent took AP/IB science course
  - 39 percent did not take AP/IB science course

Science – below *Basic*

- 8 percent had advanced science as highest science course completed
  - 18 percent had physics as highest science course completed
  - 37 percent had chemistry as highest science course completed
  - 32 percent had biology as highest science course completed
  - 5 percent had general or earth science as highest science course completed
- 9 percent top 25% science GPA (3.27–4.00)
  - 20 percent 2nd highest 25% science GPA (2.67–3.26)
  - 32 percent 3rd highest 25% science GPA (2.00–2.66)
  - 39 percent bottom 25% science GPA (0.00–1.99)
- 3 percent took AP/IB science course
  - 97 percent did not take AP/IB science course

NOTE: Details may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2005.

FIGURE 15 Average mathematics and science NAEP scores, by academic characteristics

MATHEMATICS

ADVANCED 216-300

This presents the average NAEP mathematics scores for graduates with different curricula and GPAs. For example, the average NAEP mathematics score for graduates with a 4.0 GPA in calculus is 199.

PROFICIENT 176-215

199 GPA in calculus is 4.0
193 Took AP/IB mathematics course
192 Calculus: highest mathematics course completed
188 Rigorous curriculum completed
178 Top 25% mathematics GPA (3.20–4.00)

BASIC 141-175

164 Advanced mathematics: highest mathematics course completed
156 Midlevel curriculum completed
155 2nd highest 25% mathematics GPA (2.62–3.19)
145 Did not take AP/IB mathematics course
144 3rd highest 25% mathematics GPA (2.00–2.61)
142 Algebra II: highest mathematics course completed
141 Standard curriculum completed

BELOW BASIC 0-140

139 Below standard curriculum completed
129 Bottom 25% mathematics GPA (0.00–1.99)
126 Geometry: highest course completed
110 Algebra I or below: highest mathematics course completed

SCIENCE

ADVANCED 210-300

PROFICIENT 178-209

184 GPA in advanced science is 4.0
180 Took AP/IB science course
179 Rigorous curriculum completed

BASIC 146-177

173 Advanced science: highest science course completed
172 Top 25% science GPA (3.27–4.00)
157 Physics: highest science course completed
154 Midlevel curriculum completed
153 2nd highest 25% science GPA (2.67–3.26)

BELOW BASIC 0-145

145 Did not take AP/IB science course
144 Chemistry: highest science course completed
141 3rd highest 25% science GPA (2.00–2.66)
139 Standard curriculum completed
137 Below standard curriculum completed
129 Biology: highest science course completed
129 Bottom 25% science GPA (0.00–1.99)
115 General or earth science: highest science course completed

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2005.

GENDER

differences exist in academic records. While females complete more challenging curricula and earn higher GPAs, they do not perform as well on NAEP as males with the same academic records.

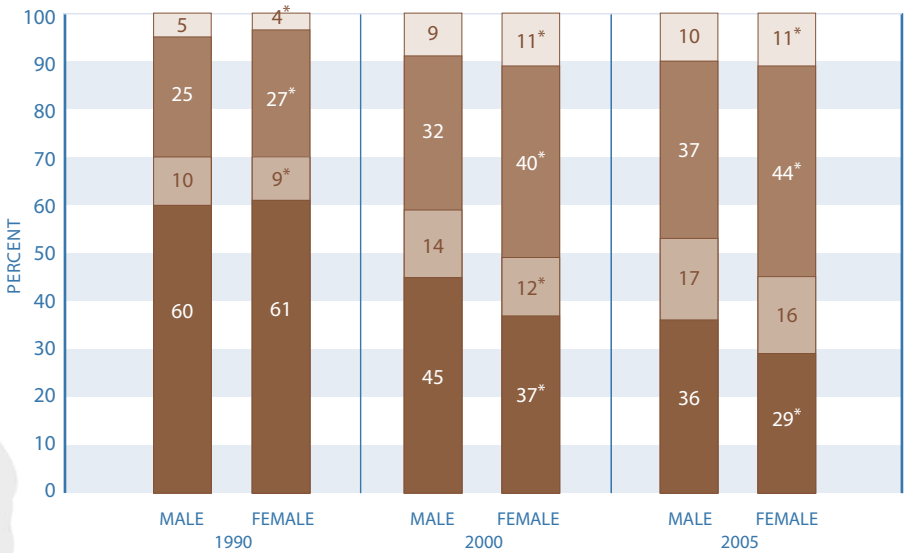
Over time, female graduates have caught up with, and now surpass, male graduates in completing rigorous curricula and earning mathematics and science credits.

BOTH MALES AND FEMALES COMPLETE MORE CHALLENGING CURRICULA

As seen in figure 16, in 2005, the percentage of male graduates who had completed a rigorous curriculum was 10 percent compared to 5 percent in 1990. For female graduates, the comparable rates were 11 percent in 2005 compared to 4 percent in 1990. The percentage of graduates who had completed a midlevel or standard curriculum was also higher in 2005 than in 1990 for both males and females. Between 2000 and 2005, the percentages completing a standard or midlevel curriculum also increased; however, there were no significant differences in the percentages who had completed a rigorous curriculum for either males or females.

The female-male curriculum level gaps at the midlevel and above curricula were significantly larger in 2005 than in 1990. The percentage of females completing a rigorous curriculum was 1 percentage point higher than males in 2005 compared to its being 1 percentage point lower than males in 1990. In 2005, the percentage of females completing a midlevel curriculum was 8 percentage points higher than males compared to a 2 percentage point difference in 1990. None of the curriculum level gaps changed significantly between 2000 and 2005.

FIGURE 16
Curriculum level completed, by gender: 1990, 2000, and 2005



*Significantly different ($p<.05$) from males.

NOTE: Details may not sum to total because of rounding.

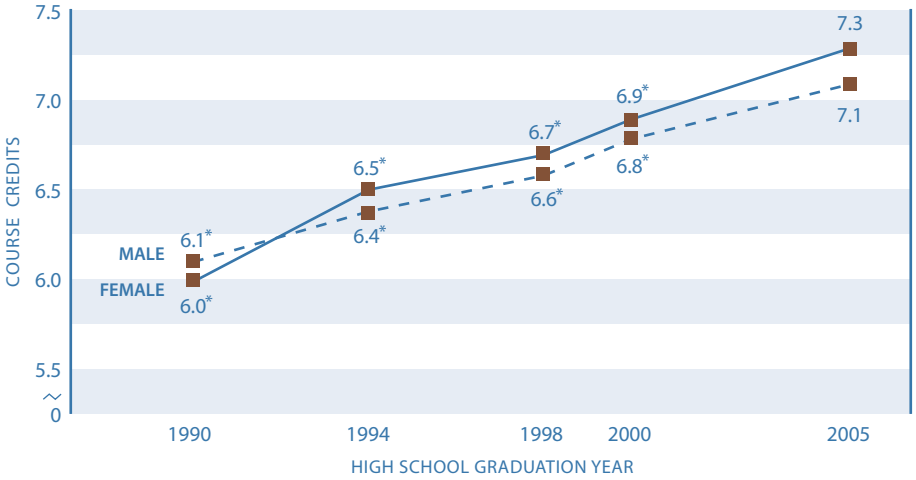
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2005.

Figure 17 shows that female graduates have also surpassed their male counterparts in credits earned in mathematics and science. In 2005, females earned 0.2 credits more than males in mathematics and science combined or an additional 24 hours of classroom instruction in these fields. In 1990, female graduates earned 0.1 fewer mathematics and science credits than male graduates did.

FIGURE 17
Credits earned in mathematics and science, by gender: 1990–2005

*Significantly different (p<.05) from 2005.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2005.



Females earn more credits in other academic courses than males

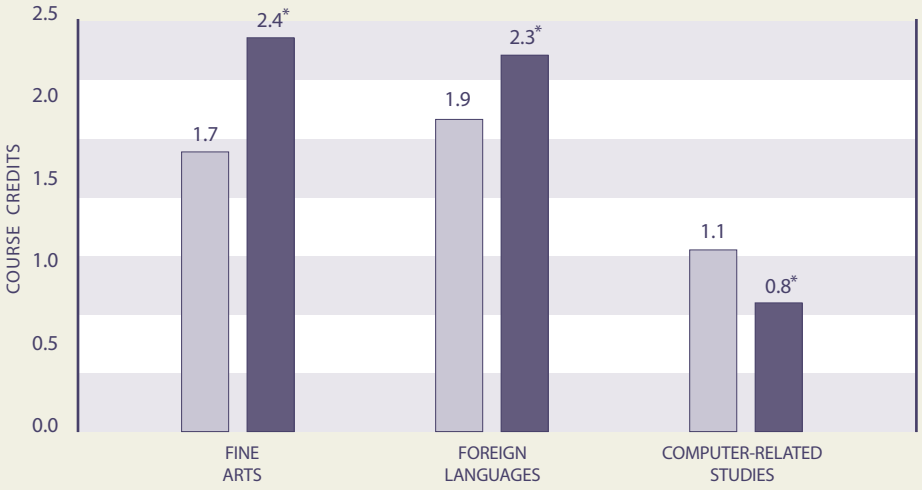
As seen in figure 18, male-female differences vary across the three fields constituting other academic courses. In fine arts, female graduates earned almost 50 percent more credits than male graduates did (2.4 credits compared to 1.7 credits). Female graduates also earned more credits in foreign languages than male graduates did (2.3 credits compared to 1.9 credits); however, the difference is smaller than that for fine arts (0.7 credits compared to the 0.4 credits). In computer-related studies, female graduates earned fewer credits than male graduates (0.8 to 1.1 credits).

FIGURE 18
Credits completed in other academic courses, by gender: 2005

Male
Female

* Significantly different (p<.05) from males.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2005.



Females outperform males on GPA overall and in mathematics and science

As shown in figure 19, female graduates' overall GPA was significantly higher than male graduates' GPA in all HSTS years. Although the gap in 2005 did not differ significantly from that in 2000, it was significantly larger in 2005 than in 1990.

In addition to having higher overall GPAs, female graduates had higher combined GPAs in mathematics and science than male graduates in all years, as shown in figure 20. The 2005 gap between female and male graduates in both fields was larger in 2005 than in 1990. Both male and female graduates had higher overall GPAs and higher mathematics and science GPAs in 2005 than in 1990.

FIGURE 19
Overall GPA, by gender: 1990–2005

*Significantly different (p<.05) from 2005.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2005.

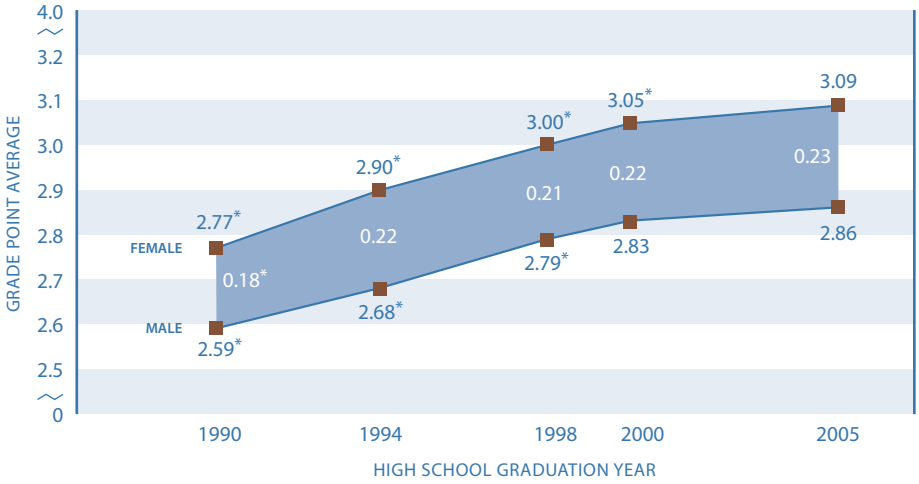
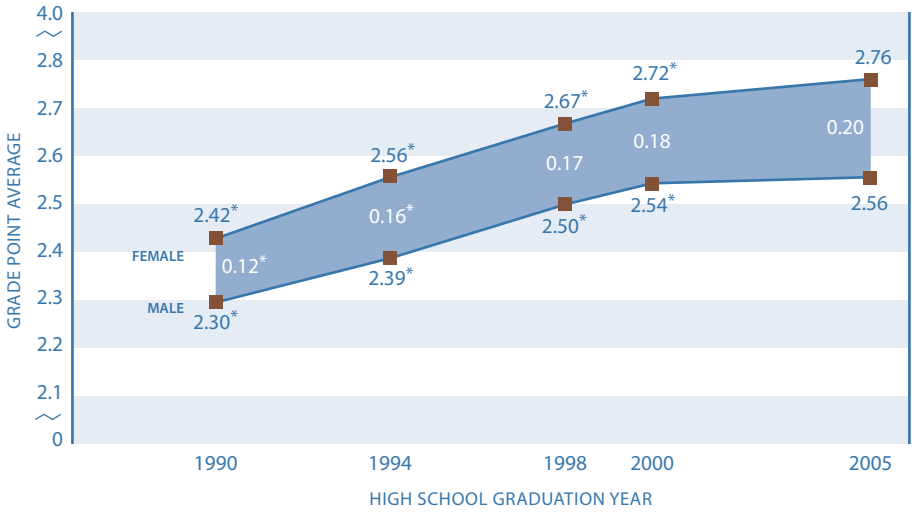


FIGURE 20
Mathematics and science combined GPA, by gender: 1990–2005

*Significantly different (p<.05) from 2005.

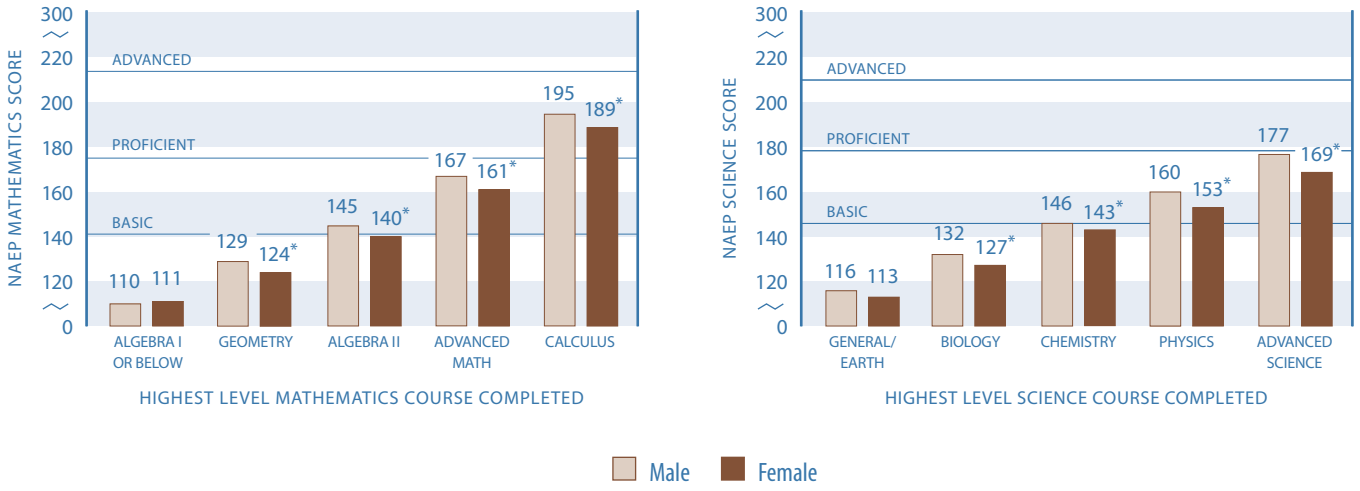
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2005.



Males earn higher NAEP mathematics and science scores than comparable female graduates

In 2005, NAEP mathematics and science scores for males were both 4 points higher than for females. As seen in figure 21, a disparity in scores was evident at most levels of coursetaking. Males outperformed females by an average of 5 to 6 points if the highest level mathematics course completed was geometry, algebra II, advanced mathematics, or calculus. There was no significant gender difference in scores if the highest mathematics class taken was algebra I or below. In science, the size of the male-female gap in scores ranged from 3 points if the highest science course taken was chemistry to 9 points if the highest science class taken was advanced science. There was no significant difference between male and female graduates whose highest science course taken was earth science or a general science course.

FIGURE 21 NAEP mathematics and science scores, by highest course completed and gender: 2005



*Significantly different (p<.05) from males.

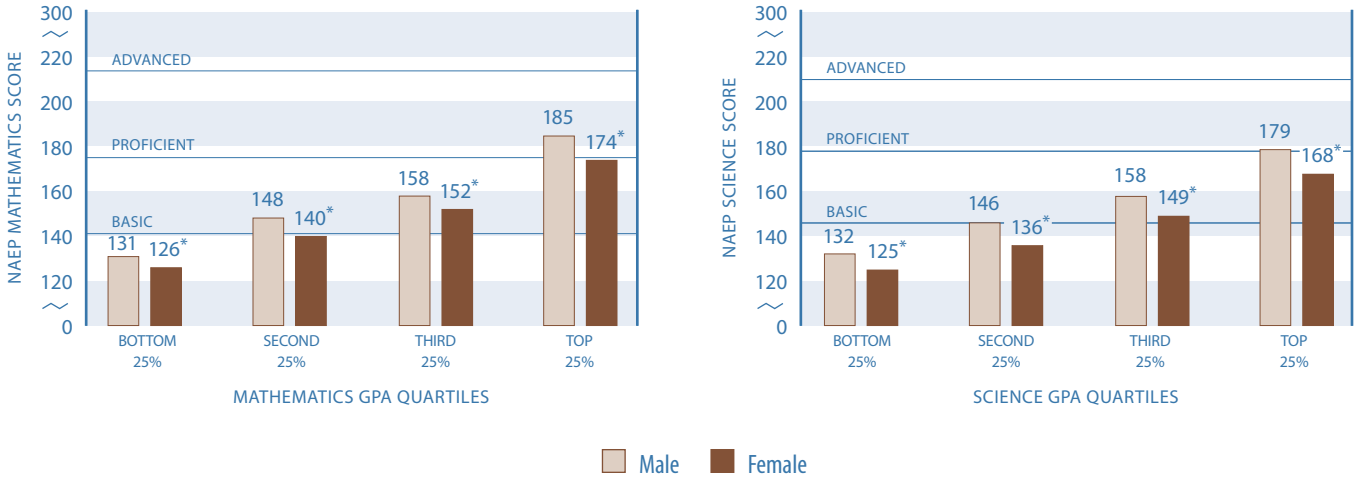
NOTE: Advanced mathematics includes courses, other than calculus, that are generally taken after algebra II (e.g., AP statistics and precalculus). Advanced science courses are courses that contain advanced content (like AP biology, IB chemistry, AP physics, etc.) or are considered second-year courses (chemistry II, advanced biology, etc.).

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2005.

The pattern of male graduates outperforming female graduates on the NAEP mathematics and science assessments was also apparent when comparing students in the same mathematics or science GPA quartiles. For example, as seen in figure 22, male graduates achieved higher average NAEP mathematics scores than female graduates in all four mathematics GPA quartiles. The size of the gap ranged from 5 to 11 points. As with

mathematics, the gender differences in science scores occurred regardless of science GPA, with males having consistently higher average science scores than females within the same GPA quartile.

FIGURE 22 NAEP mathematics and science scores, by GPA and gender: 2005



*Significantly different (p<.05) from males.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2005.

RACIAL/ETHNIC

groups' curricula rigor and GPAs are increasing. Black graduates have closed the gap with White graduates at the midlevel curriculum, but Hispanic graduates still lag.

GPAs for all groups have increased, with Asian/Pacific Islander and White graduates continuing to earn higher GPAs than Black and Hispanic graduates.

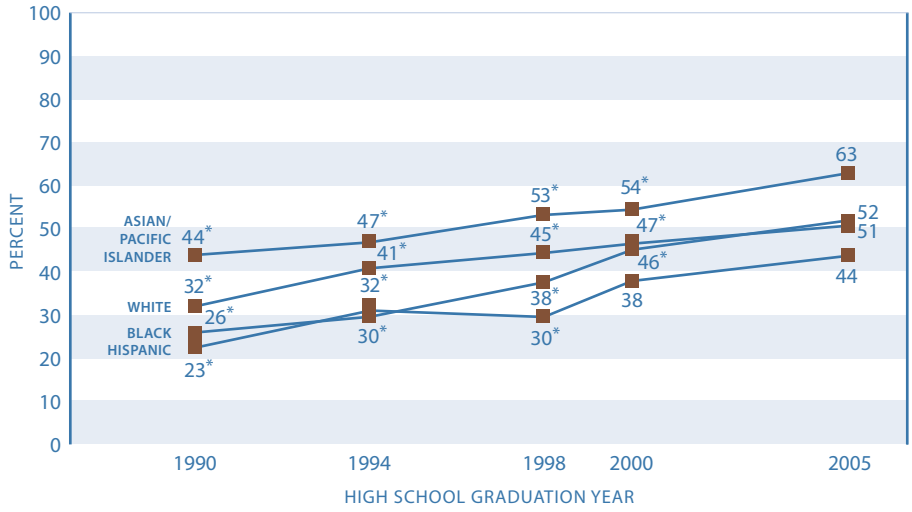
ALL RACIAL/ETHNIC GROUPS COMPLETE MORE CHALLENGING CURRICULA

Figure 23 indicates that the percentage of White, Black, Hispanic, and Asian/Pacific Islander graduates completing curricula at or above midlevel has increased since 1990. Asian/Pacific Islander graduates consistently completed more challenging curricula than other racial/ethnic groups during this time.

FIGURE 23
Percent completing curriculum at or above midlevel, by race/ethnicity: 1990–2005

* Significantly different (p<.05) from 2005.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2005.

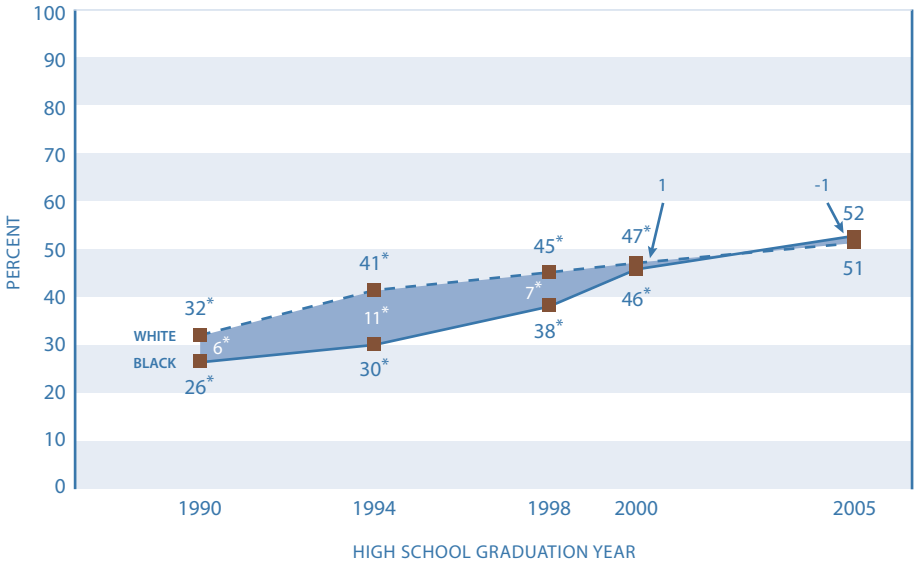


In 2005, there was not a significant difference between the percentage of Black and White graduates completing a curriculum at or above midlevel, as seen in figure 24. This differed from 1990, when there was a 6 percentage point White-Black gap. Although not shown, White graduates continued to complete a rigorous curriculum at a higher rate than Black graduates (11 percent compared to 6 percent).

FIGURE 24
White-Black gap in percent completing curriculum at or above midlevel: 1990–2005

* Significantly different (p<.05) from 2005.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2005.



Race/ethnicity of high school dropouts

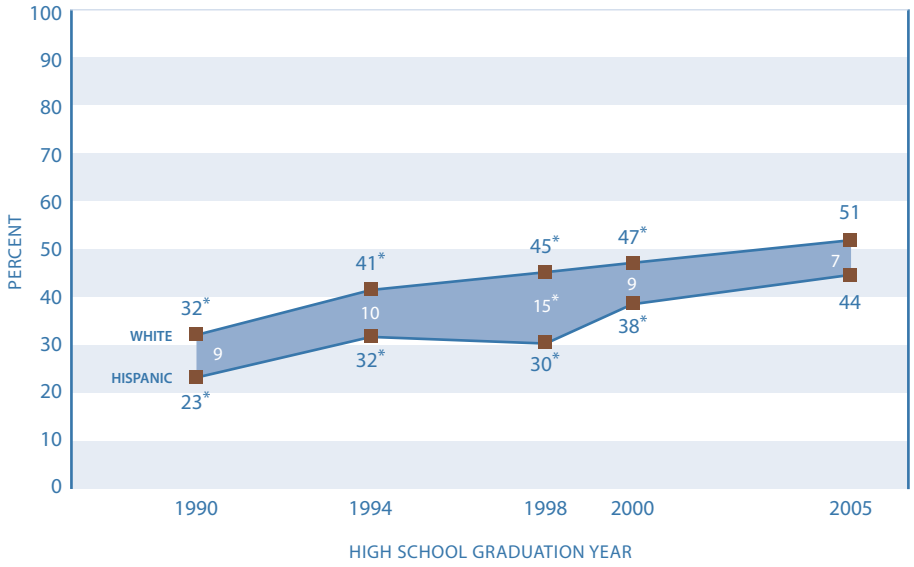
The HSTS only obtains information about high school graduates, so the experiences of high school dropouts are not included. It is especially important to keep this in mind in interpreting information for racial/ethnic groups. For example, in 2004, approximately 7 percent of Whites, ages 18 through 24 who were no longer in elementary or secondary school, had not graduated from high school. The corresponding percentage for Blacks was 12 percent. For Hispanics, it was 24 percent, and for Asian/Pacific Islanders, it was 4 percent. Among Hispanics, those who were born outside the 50 states and the District of Columbia were more likely to have been dropouts than Hispanics born in the United States (38 percent versus 14 percent). (SOURCE: U.S. Department of Commerce, Census Bureau, Current Population Survey, October 2004.)

As shown in figure 25, the gap between White and Hispanic graduates in completing a curriculum at or above midlevel in 2005 was not significantly larger than in 2000 or 1990. Although not shown here, there was also no progress in reducing the White-Hispanic gap for the percentage who completed a standard-level curriculum or better during this time. For Hispanic graduates, the percentage completing a rigorous curriculum in 2005 was 3 percentage points less than their White counterparts (8 percent compared to 11 percent).

FIGURE 25
White-Hispanic gap in percentage completing a curriculum level at or above midlevel: 1990–2005

* Significantly different (p<.05) from 2005.

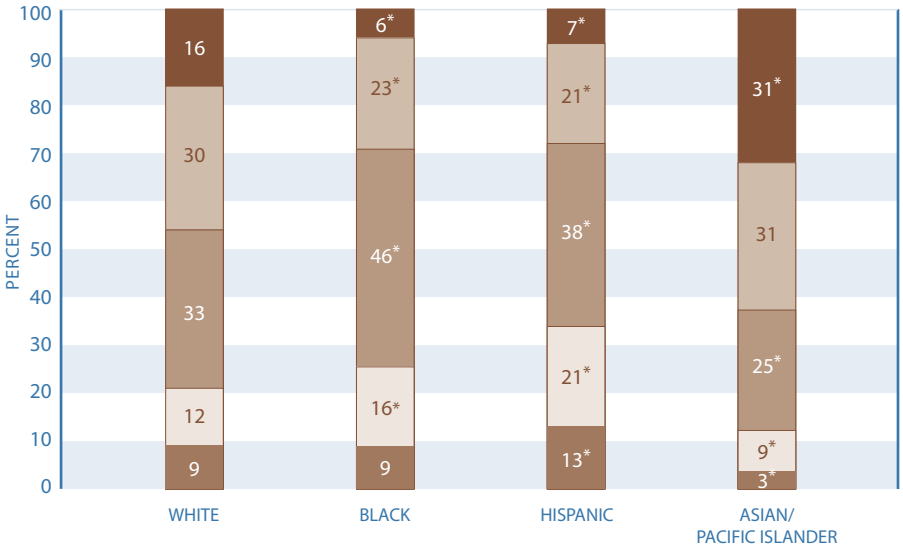
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2005.



Consistent with the 2005 racial/ethnic differences in completion of a curriculum at or above the midlevel, figures 26 and 27 show that there were significant differences by race/ethnicity in the highest level of mathematics and science courses taken. Asian/Pacific Islander graduates completed calculus or other advanced mathematics courses at a higher rate than all other racial/ethnic groups (62 percent compared to 46 percent for White

graduates, 29 percent for Black graduates, and 28 percent for Hispanic graduates). They were also more likely than other racial/ethnic groups to have completed advanced science or physics (62 percent compared to 46 percent for White graduates, 34 percent for Black graduates, and 32 percent for Hispanic graduates).

FIGURE 26
Highest level mathematics course completed, by race/ethnicity: 2005

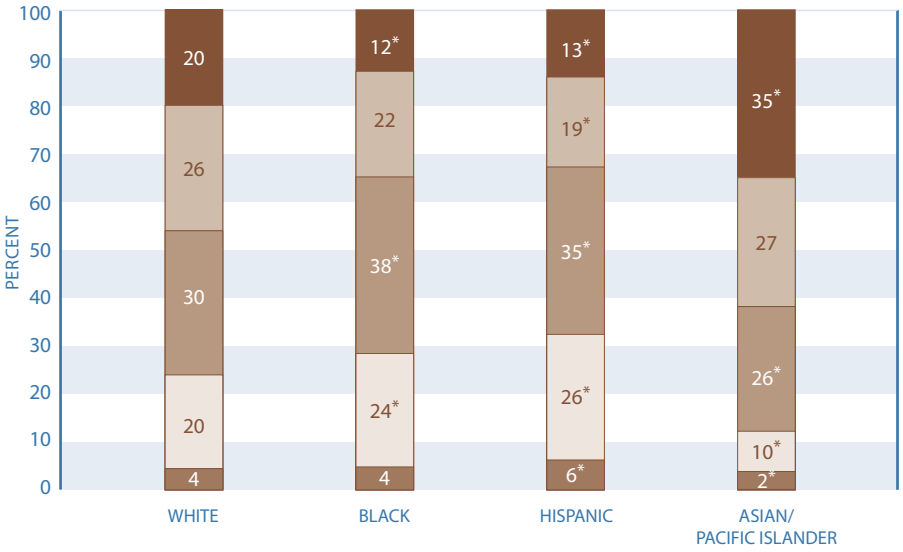


*Significantly different (p<.05) from White graduates.

NOTE: Details may not sum to total because of rounding. Advanced mathematics includes courses, other than calculus, that are generally taken after algebra II (e.g., AP statistics and precalculus).

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2005.

FIGURE 27
Highest level science course completed, by race/ethnicity: 2005



*Significantly different (p<.05) from White graduates.

NOTE: Details may not sum to total because of rounding. Advanced science courses are courses that contain advanced content (like AP biology, IB chemistry, AP physics, etc.) or are considered second-year courses (chemistry II, advanced biology, etc.).

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2005.

In each racial/ethnic group, most graduates with disabilities receive standard diplomas

Approximately 90 percent of 2005 graduates identified by their schools as having disabilities received either a standard or honors diploma. The remaining 10 percent of the graduates received either a special education diploma or a certificate of completion. This analysis, unlike the analyses in the rest of the report, includes graduates who received a special education diploma or a certificate of completion. Black and Hispanic graduates with disabilities were less likely to receive a standard or honors diploma than White graduates with disabilities (81 percent of Black graduates and 87 percent of Hispanic graduates, compared to 94 percent of White graduates).

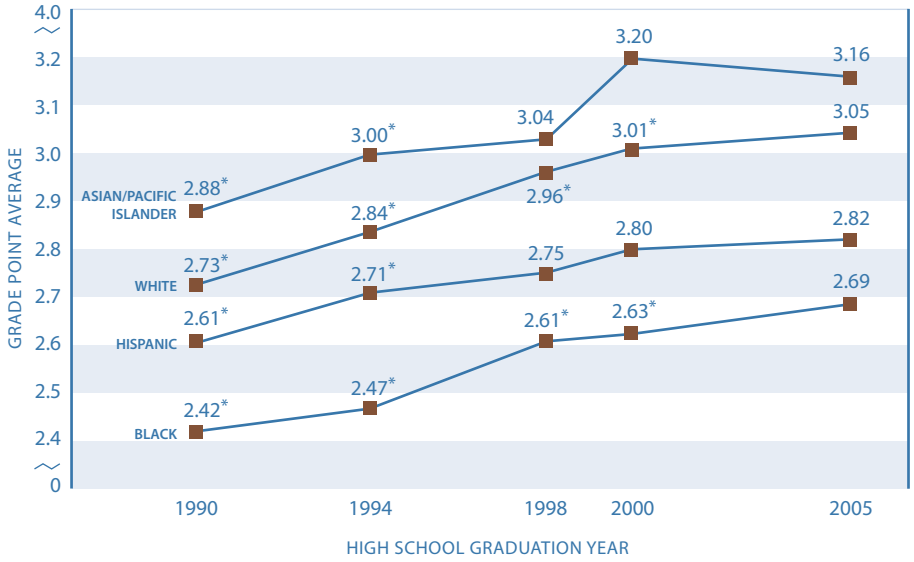
GPA INCREASES FOR ALL RACIAL/ETHNIC GROUPS

As shown in figure 28, the GPA of graduates from all major racial/ethnic groups increased from 1990 to 2005. However, only White and Black graduates earned higher GPAs in 2005 than in 2000. In all years, White and Asian/Pacific Islander graduates earned higher GPAs than Black and Hispanic graduates.

FIGURE 28
Trends in GPAs of graduates, by race/ethnicity: 1990–2005

*Significantly different (p<.05) from 2005.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2005.



White-Black and White-Hispanic GPA gaps increase from 1990, but do not change significantly from 2000

White graduates earned higher GPAs than Black or Hispanic graduates in all years, as shown in figures 29 and 30. The 2005 gaps were significantly larger than the 1990 gaps. There was no significant change in the size of the gaps between 2000 and 2005. The White-Black gap in 2005 was 0.36 points, slightly more than a third of a letter grade.

FIGURE 29
White-Black gap in GPA: 1990–2005

* Significantly different (p<.05) from 2005.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2005.

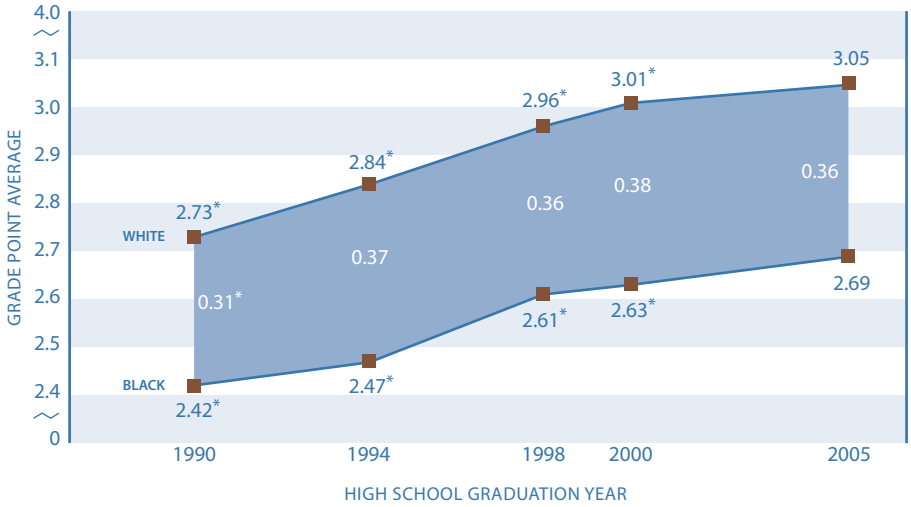
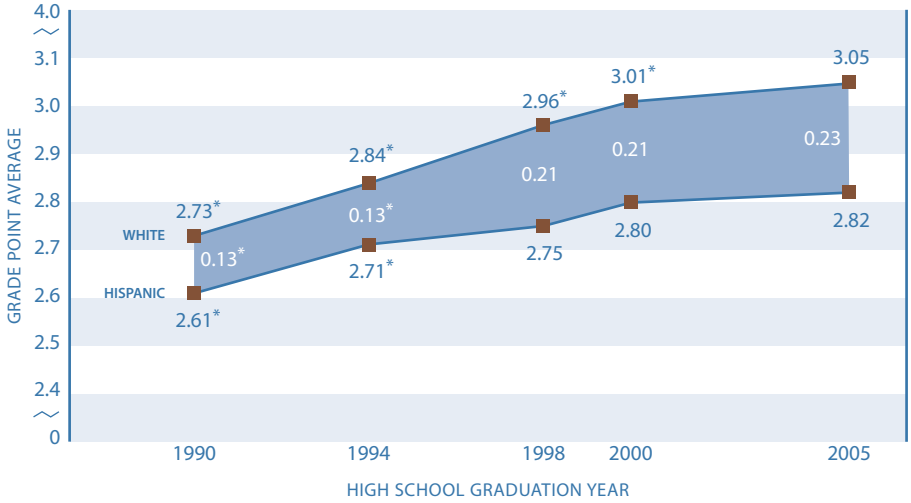


FIGURE 30
White-Hispanic gap in GPA: 1990–2005

* Significantly different (p<.05) from 2005.

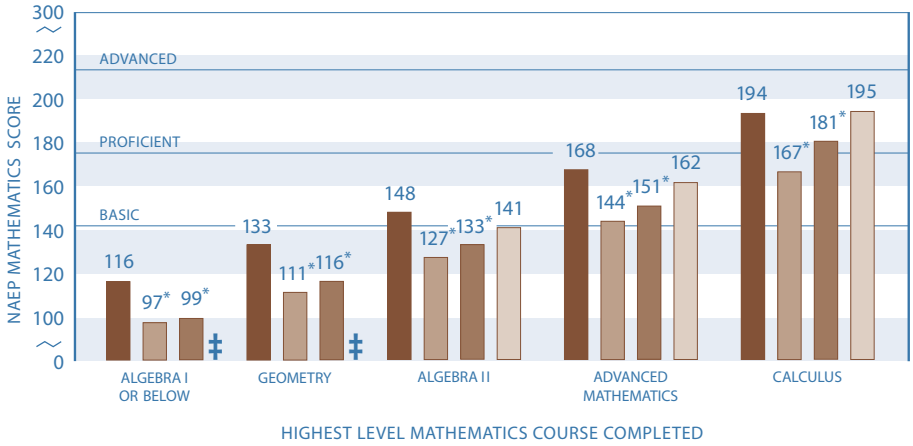
SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), various years, 1990–2005.



ASIAN/PACIFIC ISLANDER AND WHITE GRADUATES HAVE HIGHER AVERAGE NAEP SCORES THAN BLACK AND HISPANIC GRADUATES TAKING MATHEMATICS AND SCIENCE COURSES AT THE SAME LEVELS

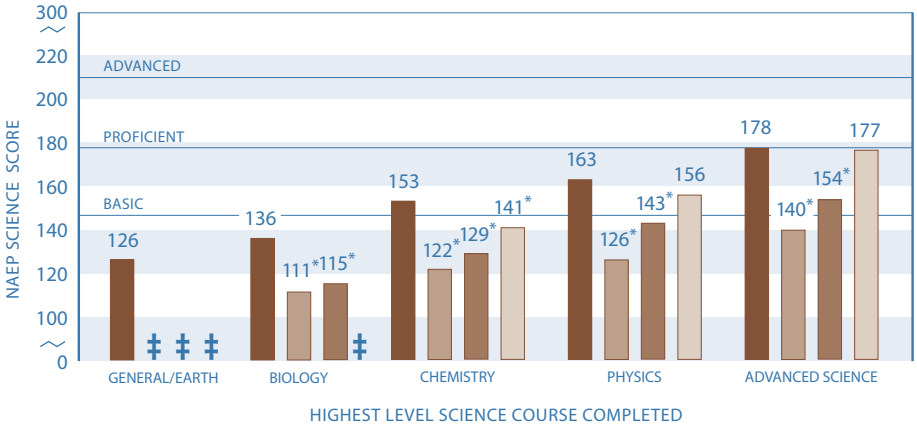
White, Hispanic, and Asian/Pacific Islander graduates who took calculus had average mathematics NAEP scores at the *Proficient* achievement level, as seen in figure 31. However, the average score of Black graduates whose highest course was calculus was at the *Basic* level.

FIGURE 31
NAEP mathematics scores, by race/ethnicity and highest level course taken: 2005



As shown in figure 32, the average science scores of Asian/Pacific Islander and White graduates were higher than those of Black and Hispanic graduates whose highest level science course was the same. For example, the average White score on the NAEP science assessment for graduates completing advanced science was 178. This was not significantly different from the score for Asian/Pacific Islander graduates, but was above the scores for both Black and Hispanic graduates (140 and 154, respectively).

FIGURE 32
NAEP science scores, by race/ethnicity and highest level course taken: 2005



As seen in figures 33 and 34, within each of the mathematics and science GPA quartiles, White and Asian/Pacific Islander graduates had higher NAEP scores than Black and Hispanic graduates on the corresponding NAEP assessment. For example, White and Asian/Pacific Islander graduates in the top quartile for mathematics GPA scored, on average, at the *Proficient* level in mathematics, while Black and Hispanic graduates in the top quartile scored at *Basic*.

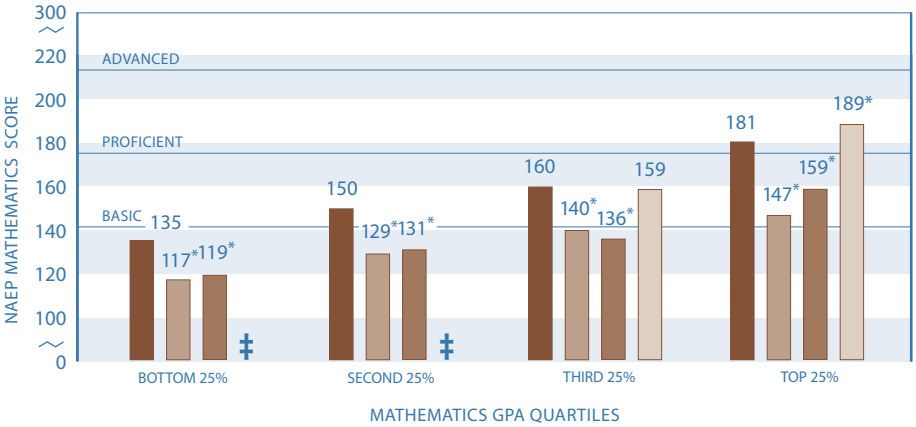
FIGURE 33
NAEP mathematics scores, by race/ethnicity and GPA quartile: 2005

White
Black
Hispanic
Asian/Pacific Islander

‡ Reporting standard not met.

*Significantly different (p<.05) from White graduates.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2005.



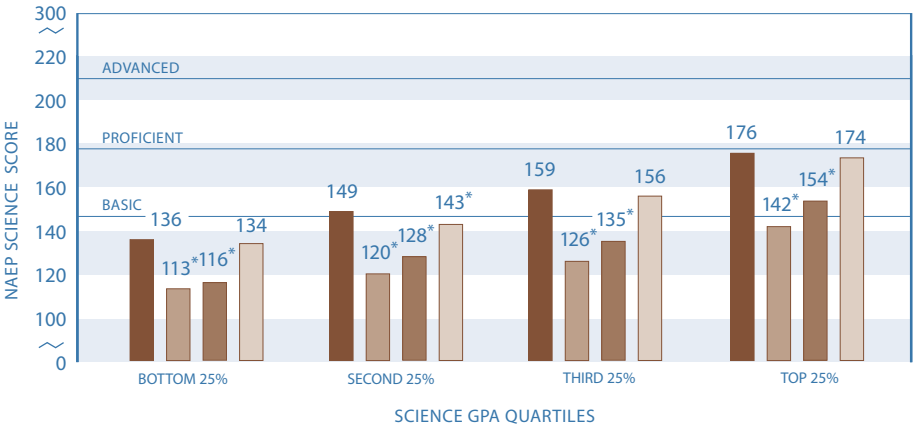
Regardless of race/ethnicity, NAEP assessment scores increased as subject-specific and overall GPA increased. For example, among Black high school graduates, mathematics scores increased from an average of 117 for those having a mathematics GPA in the bottom quarter to 147 for those in the top quarter. In science, scores for Black graduates rose from an average of 113 in the bottom quarter of the science GPAs to 142 in the top quarter.

FIGURE 34
NAEP science scores, by race/ethnicity and GPA quartile: 2005

White
Black
Hispanic
Asian/Pacific Islander

*Significantly different (p<.05) from White graduates.

SOURCE: U.S. Department of Education, Institute of Education Sciences, National Center for Education Statistics, High School Transcript Study (HSTS), 2005.



Improvements in academic records not reflected in NAEP trends

Recently published NAEP data show that twelfth-grade mathematics and science scores have not increased commensurate with the increases in the number of students taking higher-level courses in mathematics and science, credits earned in mid- and rigorous-level courses, and improvements in GPA described in this report.

This raises a question: How can increasing numbers of students be taking more credits and more rigorous curricula without increased performance on the Nation's Report Card? There are plausible explanations. The population of students tested has changed. The cohorts of students included in NAEP reflect decade-long improvements in graduation rates, reduction in dropout rates, and increases in the percentages of students who are low income and who speak a language other than English at home (NCES 2006-071). The lack of congruence might also be associated with declining motivation among twelfth graders to do well on relatively low-stakes assessments such as NAEP, a problem that may increase as NAEP faces increasing competition from high-stakes tests such as twelfth-grade graduation tests.

Further analysis of course content, instructional practices, and teacher preparation could provide other insights as to why improvements in academic records are not reflected in NAEP trends. For example, in the past 10 years, advanced course content might have become less rigorous due to an increased range in the abilities of students taking such courses (e.g., a calculus course in 1990 that differs from a calculus course in 2005 in ways that result in today's students being exposed to less content). Similarly, it is possible that the increase in the number of students taking advanced courses may have outpaced the availability of effective teachers.

Taken together, these possibilities suggest that more in-depth analyses of these data are needed to understand the patterns in the educational trends in student performance. Given the inherent limitations of the cross-sectional nature of these studies, it may not be possible to understand the patterns using NAEP and HSTS data alone—true longitudinal data may be needed to investigate such issues.

TECHNICAL NOTES

Sampling and weighting

The sample design for the NAEP 2005 High School Transcript Study (HSTS) was designed to achieve a nationally representative sample of public and private high school graduates in the Class of 2005. For public schools, the HSTS sample was the twelfth-grade public school sample for the 2005 NAEP mathematics and science assessments; that is, the HSTS sample included every eligible sampled NAEP 2005 twelfth-grade public school that was contacted for the HSTS, whether or not they actually participated in the NAEP assessments. For private schools, the HSTS sample was a subsample from the NAEP 2005 twelfth-grade private school sample for the mathematics and science assessments. This subsampling process was carried out because private schools were oversampled in NAEP 2005. For HSTS, the sample design called for the private schools' sample size to be proportionate to their share of eligible students.

For NAEP-participating schools, only schools that assessed students in the main NAEP study mathematics or science tests were eligible for the HSTS. Within these schools, the HSTS used the same NAEP mathematics and science student samples. For schools that were selected for NAEP but did not participate, graduates were randomly selected. Approximately 94 percent of the HSTS sampled students were enrolled in schools that also participated in the NAEP assessments. Around 63 percent of the participating HSTS students also participated in the NAEP.

All estimates were weighted using sampling weights to provide unbiased estimates of the national population. Two types of HSTS weights, NAEP-linked weights and HSTS sample weights, were used in the analysis of these data. NAEP-linked weights were designed for analyses involving NAEP assessment scores or NAEP-based data such as student questionnaire data. These analyses only included transcripts from graduates who participated in a NAEP mathematics or science assessment. HSTS sample weights were designed for all aggregations that did not rely on NAEP-based data, and they encompassed all of the transcripts in the study.

School and student participation rates

To ensure unbiased samples, NCES established participation rate standards for national studies that must be met in order for the results to be reported without a nonresponse bias analysis. Participation rates for the original sample needed to be at least 85 percent for both schools and graduates. Although the weighted graduate within-school response rate was about 99.7 percent, the NAEP HSTS school response rate (84.2 percent) fell slightly below this NCES standard. A nonresponse bias analysis was conducted on public schools and private schools to determine whether the school characteristics from nonresponding schools showed significant differences from the responding schools. The characteristics that were analyzed in public schools included region, school location, grade enrollment, minority school (high/low), and percent minority for each of the races. The significant differences in public schools were found in region, school location, and percent minority. A similar analysis was conducted on private schools that included school type (i.e., Catholic, conservative Christian, Lutheran, nonreligious private, other private). Among private schools, significant differences were found in school type. Nonresponse weighting adjustments were used to correct for these differences among public and private schools. Although the differences found between respondents and nonrespondents are small for both public and private schools, it is unlikely that nonresponse weighting adjustments completely accounted for the differences.

Target population

The target population for HSTS 2005 included all students in public and private schools in the United States who were enrolled in twelfth grade in 2004–05 and who graduated in 2005. The HSTS collected a nationally representative sample of over 26,000 transcripts (from over 29,000 students in the sample), representing approximately 2.7 million 2005 high school graduates. The selected students excluded from the study included ineligibles, nongraduates, and students having incomplete transcripts. For each graduate, transcript information was collected for the ninth through the twelfth grade. Transcripts were collected from about 640 public schools and 80 private schools.

Analytical sample

To be consistent with previous published analyses of the NAEP HSTS data, almost all of the analyses presented in this report only included graduates with regular or honors diplomas. However, the analysis of the type of diplomas that graduates with disabilities received included those graduates who received special education diplomas or certificates of completion. Students who did not graduate or who had less than 3 years of transcript data were excluded from all of the analyses. The criteria for inclusion in the analyses in this report were established to ensure that the transcripts were complete and valid. They also restricted the analyses to those high school graduates with 16 or more earned Carnegie credits and a nonzero number of English Carnegie credits. Some of the analyses in the report focused on NAEP and high school achievement. These analyses were conducted on subsets of the sample. They were limited to the eligible graduates from the HSTS who had also participated in the NAEP assessments (approximately 17,000 of the graduates in the HSTS sample). Curriculum-level analyses, comparisons of seniors with underclassmen, and analyses of the highest mathematics and science courses completed by the course taken in the freshman year were limited to graduates with transcript data in all 4 years.

Variance estimation

Graduate estimates based on the HSTS were subject to sampling error because they were derived from a sample, rather than the whole population. Sampling error was measured by the sampling variance, which indicated how much the

population estimate for a given statistic was likely to change if it had been based on another equivalent sample of individuals drawn in exactly the same manner as the actual sample. Since the HSTS used a complex sample design with two-stage sampling and unequal selection probabilities, along with complex weighting procedures, standard textbook formulas could not be used for estimating variances. Instead, variances were estimated using jackknife replication methods (Krewski and Rao 1981). This estimation involved constructing a number of subsamples (replicates) from the full sample and computing the statistic of interest for each replicate. Measuring the variability among the replicates leads to an accurate estimate of variance for the full sample.

Interpreting statistical significance

Comparisons over time or between groups were based on statistical tests that considered both the size of the differences and the standard errors of the two statistics being compared. When an estimate—such as an average score—had a large standard error, a numerical difference that seemed large may not be statistically significant (i.e., a null hypothesis of no difference could not be rejected with sufficient confidence). Differences of the same size may or may not have been statistically significant for different comparisons depending on the size of standard errors involved. In the tables and charts of this report, the symbol (*) was used to indicate that a score or percentage in a previous assessment year was significantly different from the comparable measure in 2005 or to indicate that, within the current year, differences between groups (such as scores of White and Black graduates) were significantly different.

Any differences between scores or percentages discussed in this report are statistically significant at the 0.05 level. No adjustments are made for multiple comparisons.

Nonsampling error

As in any statistical study, the HSTS estimates are subject to nonsampling errors as well as sampling errors. For example, the appropriate CSSC code for classifying courses is not always clear because of insufficient or inaccurate information provided by schools leading to measurement error.

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