From Track to Field: Trends in Career and Technical Education Across Three Decades

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EXECUTIVE SUMMARY

This report examines change and stability across two decades in the sociodemographic characteristics, educational experiences, and postsecondary outcomes of high school graduates with different occupational coursetaking patterns. Occupational coursetaking is part of the broader field of career and technical education (CTE), which also includes general labor market preparation and family and consumer sciences education courses. Historically, CTE and occupational studies provided low-achieving or academically disengaged students with courses that prepared them for immediate entry into the labor market. However, the expansion of new types of career education within magnet schools, career academies, and traditional high schools, and the increasingly accepted perspective that all students can benefit from training that improves their workplace skills, suggests that the older dichotomies between college-bound academic education and work-oriented occupational preparation are less salient. To examine whether this is the case, this report analyzes three high school cohorts—the graduating classes of 1982, 1992, and 2004—and compares their involvement in CTE and occupational courses, their academic coursetaking and achievement outcomes, and their initial postsecondary school and work experiences.

We find that CTE, as measured by occupational coursetaking, has moved from being a clearly delineated vocational track for graduates headed to jobs immediately after high school to an exploratory program for an increasing proportion of both academic and general curriculum graduates. This shift from "track to field" involves smaller groups of graduates intensively studying an occupational area and larger groups of graduates earning a few occupational credits. It also coincides with shifts toward more academic coursetaking, improved academic achievement in math, and more involvement in postsecondary education for those with more involvement in occupational preparation. Before describing these findings further, the definitions and methodology for the report are explained.

Occupational Coursetaking and Academic Orientation

CTE participation can be measured a variety of ways, but perhaps the most consistent method is to examine coursetaking in occupational areas. While indicators of participation in specific types of training or education programs such as technical preparation programs or attendance at CTE high schools are valid measures of CTE participation, using coursetaking information (in this report, drawn directly from high school transcripts) permits distinguishing graduates within schools or programs and providing a common metric to compare graduates enrolled in programs or schools that may not be equivalent in terms of resources provided or overall experience.

Occupational area courses are those that train students in specific labor market skills for work in fields such as accounting, construction, health care, and others. They differ from general labor market skills (such as keyboarding) that can be used throughout many occupations and from family and consumer science courses (such as home economics) which are intended to provide skills for private life. In this report, occupational courses are divided into 11 areas:

1. Agriculture and Natural Resources;
2. Architecture, Construction, and Science Technology;
3. Business;
4. Communications and Design;
5. Computer and Information Science;
6. Consumer and Culinary Services;
7. Engineering Technologies;
8. Health Sciences;
9. Manufacturing, Repair, and Transportation;
10. Marketing; and
11. Public Services.

Using courses defined in these 11 areas, this report groups occupational coursetakers into one of four categories, which are classified into two broad groups, as shown in the exhibit.

Exhibit. Occupational Investment Categories

Noninvestor
1. **Nonparticipant**: fewer than 1 total occupational credits earned 2. **Sampler**: 1 to fewer than 3 total occupational credits
Investor
3. **Explorer**: 3 or more total occupational credits, but no single occupational area with 3 or more credits 4. **Concentrator**: 3 or more total occupational credits in at least one area (i.e., may earn 3 or more credits in more than just one occupational area)

Concentration in a single occupational area is a traditional measure of CTE involvement. By concentrating their studies in specific occupational areas, high school graduates may earn specialized skills that are valuable to employers and helpful in preparing for further postsecondary training and education. Such occupational concentration is an indication of sustained or in-depth preparation for work. However, CTE exploration—represented by taking 3 or more credits without concentration—may also serve to signal employers that a graduate is focused on developing occupational skills and may give graduates multiple options for work. Noninvestors (fewer than 3 total occupational credits earned) can be distinguished based on whether they had virtually no participation in occupational courses or had sampled a small number of them.

In addition to occupational coursetaking, the credits students earn in academic subjects play a major role in shaping their postsecondary employment and educational opportunities. Traditionally, a focus on academic studies was seen as exclusive from CTE participation, and vice versa. However, because many states have raised academic requirements for graduation over the past decades, recent graduates with an occupational concentration may also have an academic focus in their other studies. Therefore, this report divides graduates into academic and general education groups, and compares occupational investors and noninvestors along this

academic orientation dimension. Academic focus graduates have earned at least four credits in English and three credits each in mathematics, science, and social studies; all other graduates are classified as general education focused. These academic criteria come from the seminal *A Nation at Risk* report (National Commission on Excellence in Education 1983).

Data and Methods

The data for this report come from three nationally representative, longitudinal studies of high schools covering the graduating classes of 1982, 1992, and 2004. All three were conducted by the National Center for Education Statistics (NCES) of the U.S. Department of Education, and were designed and carried out to provide comparable information over time. The first study used, High School and Beyond (HS&B), began with a cohort of sophomores in 1980 and resurveyed them in 1982 (when most were seniors) and again in 1984 (as well as later). In addition, high school transcripts were gathered in 1982. The second study, the National Education Longitudinal Study of 1988 (NELS:88), began in 1988 with a cohort of eighth-graders, and resurveyed these sample members in 1990, 1992, and 1994 (as well as later). Data from the 1992 survey, which also included a high school transcript data collection, and from the 1994 survey, are used here. Finally, the Education Longitudinal Study of 2002 (ELS:2002) provides data about a recent cohort of graduates. ELS:2002 began with sophomores in 2002 and resurveyed them in 2004 and 2006. High school transcripts were also gathered as part of the 2004 survey.

The analysis uses descriptive statistics to examine patterns of occupational coursetaking, academic orientation, high school experiences, and initial postsecondary experiences both over time and within each graduating class. All estimates were weighted to represent the population of graduates from each year, and adjustments were made to account for the complex sample designs of the studies. In addition, all differences discussed in this report have been tested for statistical significance using Student's *t* test.

Key Findings

Coursetaking

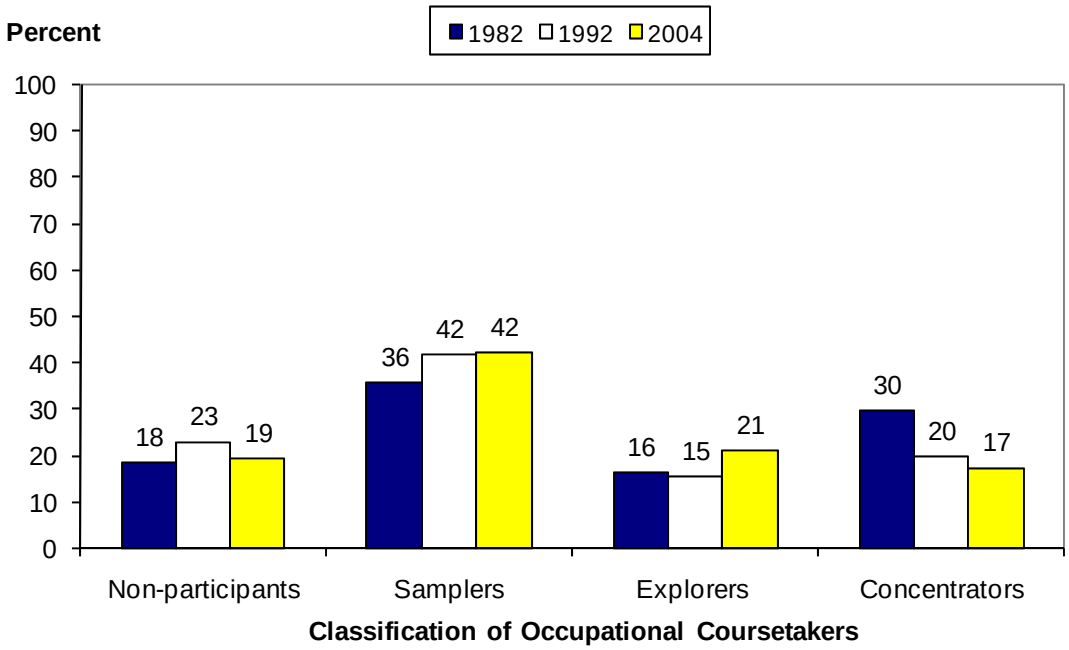
- ***Public high school graduates earned about 4.5 more credits in academic subjects in 2004 than in 1982.*** Seniors in 1982 earned 14.6 academic credits, compared to 17.4 among 1992 seniors and 19.2 among 2004 seniors. These changes are consistent with the policy changes recommended in 1983's *A Nation at Risk* and evidence from other sources. In addition, the average total number of credits high school graduates earned increased over time in two almost equal increments: 2.3 credits between 1982 and 1992, and 2.2 credits between 1992 and 2004

- ***Total credits earned in CTE courses and occupation-specific courses declined between 1982 and 1992; no differences were observed between 1992 and 2004.*** The number of CTE credits earned by graduates declined from 4.6 credits in 1982 to 3.9 credits in 1992, remaining stable at 3.8 credits among 2004 graduates. Occupational area credits made up

the bulk of CTE credits earned by each cohort. Among specific occupational program areas, graduates earned fewer total credits in business; marketing; and manufacture, repair, and transportation. In computer and information science, however, the average number of credits earned increased from 0.1 to 0.4 between the 1982 cohort and the 2004 cohort.

- ***The percentage of graduates taking occupational courses at low levels increased over time, while occupational concentration became less common (figure A).*** At the same time that overall CTE and occupational coursetaking declined across graduating cohorts, graduates increasingly spread their occupational coursetaking across multiple areas of study. The percent of graduates earning 1 to 2 credits in occupational courses grew from 36 percent in 1982 to 42 percent in 2004, and the percent of graduates earning 3 or more credits (but without concentrating) grew from 16 to 21 percent during the same period. However, the percent of graduates earning 3 or more credits in one occupational area declined from 30 percent to 17 percent from 1982 to 2004.

Figure A. Percentage of public high school graduates in categories of occupational coursetaking: 1982, 1992, and 2004



NOTE: Non-participants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

- ***Comparing students with an academic focus to those taking a general education curriculum, we find that their CTE involvement has converged.*** In 1982, these two groups of students were very different in occupational coursetaking patterns. In 2004, they were almost identical. For example, 10 percent of 1982 academic focus graduates were occupational concentrators, while 33 percent of general education graduates were concentrators. In 2004, however, the percentages were 17 and 18 percent, respectively.

- ***Increases in academic credits earned were associated with decreases in CTE or occupational credits earned.*** Each additional math or science credit earned by graduates was associated with up to 1 fewer CTE credit or 1 fewer occupational credit. However, tradeoffs between CTE or occupational credits and academic credits were weaker in 2004 compared with earlier years. For example, the effect of an additional science course on occupation-specific coursetaking in 2004 (-0.31) was less than half of what it was in 1982 (-0.71). (These results are based on bivariate regressions that estimate the average change in CTE or occupational area credits for each change in an academic credit earned.)

- ***The most common occupation-specific course in 1982 and 1992 was accounting 1, with 16 and 17 percent of graduates having earned credit in it, respectively. Among 2004 graduates, the top course was computer applications; 11 percent had taken this course.*** Among all CTE courses, keyboarding (also called typewriting) was the most common course taken by graduates, although the percentage of graduates taking keyboarding declined from 54 percent in 1982 to 25 percent in 2004.

Demographics

- ***Occupational noninvestors increasingly became female, while concentrators increasingly became male.*** Among 1982 graduates, 57 percent of nonparticipants were female, while 50 percent of concentrators were female. In 2004, however, the percentage of nonparticipants who were female had grown to 61 percent, and the percentage of concentrators who were female had dropped to 41 percent.

- ***Mirroring overall population changes, the share of White graduates declined over time for all occupational groups except concentrators. Hispanic graduates with a general education focus were heavily represented as occupational nonparticipants and samplers in 2004.*** Hispanic graduates' percentage share of general education nonparticipants doubled from 10 percent of graduates in 1982 to 23 percent of graduates in 2004, for example.

- ***In general, occupational investors were more likely than noninvestors to come from families in the bottom quartile of the socioeconomic status (SES) distribution.*** Over time, the percentage of occupational concentrators from the highest SES quartile grew from 13 to 18 percent.

Academic Performance

- ***Despite growth over time within each group, occupational explorers and concentrators reached the highest level of math (precalculus or calculus) or the highest level of science (chemistry, physics, or advanced biology) at lower rates than samplers and nonparticipants in all years.*** For example, 21 percent of occupational concentrators and 25 percent of explorers attained precalculus/calculus in 2004, compared with 34 percent of samplers and 41 percent of nonparticipants.

- ***Between 1982 and 2004, college preparation increased for graduates in all occupational coursetaking groups.*** For occupational concentrators, for example, the college preparation rate increased from 2 percent in 1982 to 16 percent in 1992 and 32 percent in 2004. However, graduates with more involvement in occupational coursetaking were less prepared than their less-involved peers.

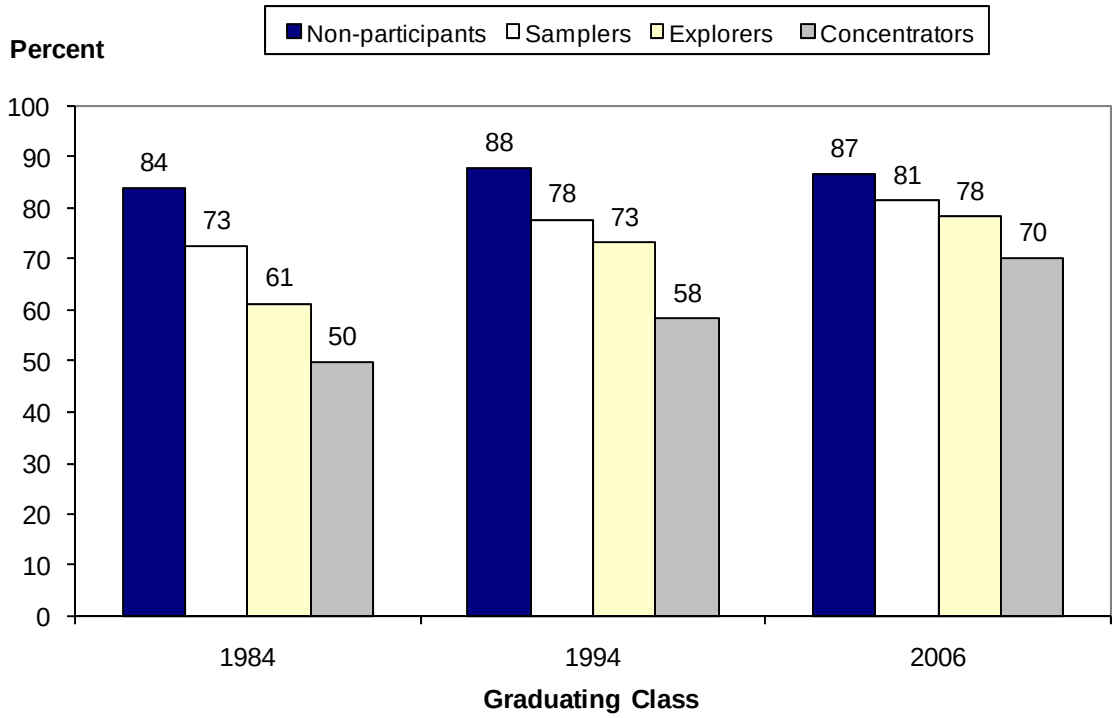
- ***While math scores for occupational nonparticipants showed no statistically significant change over time, the scores for samplers, explorers, and concentrators all grew between 1992 and 2004.*** Occupational concentrators achieved a score of 45 in 1992 and 47 in 2004, for example (on a 0 to 81 scale). The math growth between 1992 and 2004 for occupational investors was particularly large. In addition, the growth in math scores for those with more occupational coursetaking involvement was driven by gains in scores among graduates with a general education curriculum.

Postsecondary Education

- ***For all occupational coursetaking groups, graduates' senior-year expectations have shifted from lower to higher levels of education over time, although occupational investors still have lower expectations than noninvestors.*** For example, most occupational concentrators expected to attain some college or a bachelor's degree, while nonparticipants most commonly expected to attain a graduate or professional degree.

- ***The initial postsecondary participation rates of occupational concentrators rose from 50 percent in 1984 to 70 percent in 2006, but their rates still lag behind those of occupational nonparticipants (figure B).*** In 2006, for example, 87 percent of occupational nonparticipants had attended college at some point, compared to 70 percent of occupational concentrators.
- ***Greater percentages of 1992 and 2004 graduates than 1982 graduates were still enrolled in college 2 years after graduation, regardless of occupational coursetaking group.*** The percentage of the ever-enrolled occupational concentrators who were enrolled in college 2 years after graduation grew from 58 percent in 1982 to 75 percent in 2006, for example. Noninvestors, however, were more likely to remain enrolled 2 years after graduation than were investors at all three time points.

Figure B. Percentage of public high school graduates ever enrolled in a postsecondary education institution in the first 2 years after graduation, by academic orientation and occupational coursetaking categories: 1982, 1992, and 2004



NOTE: Non-participants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/84), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992" and "Third Follow-up, 1994"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004" and "Second Follow-up, 2006."

Postsecondary Employment

- ***In each cohort, professional occupations were the most frequently reported expectation for occupation at age 30; moreover, the percentage of 12th-graders with this particular expectation grew over time, for all occupational coursetaking groups.*** For example, among occupational concentrators, the percentage of graduates expecting a professional occupation at age 30 increased from 23 percent in 1982 to 37 percent in 1992 and 48 percent in 2004. Despite this increase over time within each coursetaking group, greater percentages of noninvestors held expectations of professional occupations than did occupational investors, in all years.
- ***At least 87 percent of each cohort worked for pay within their first 2 years after high school graduation, regardless of occupational coursetaking and academic orientation.*** Furthermore, within each cohort, there were no statistically significant differences across occupational coursetaking groups, either overall or by academic orientation.
- ***The number of months employed during the first 2 years after high school have not detectably changed over time. Occupational concentrators in the 1992 and 2004***

cohorts averaged more months of employment than did their noninvestor counterparts. For example, in 2006, concentrators averaged 1 more month of employment (14) than did samplers and nonparticipants (13 months each).

- ***In each cohort, occupational concentrators were more likely than noninvestors to have a first-job type of craftsperson.*** In the most recent cohort, they were also more likely to have a first-job type of laborer/farmer and skilled operative. In 1994 and 2006, noninvestors were more likely than concentrators to have a sales/service first-job type.

1. INTRODUCTION AND RESEARCH BACKGROUND

Introduction

This report examines change and stability across two decades in the sociodemographic characteristics, educational experiences, and postsecondary outcomes of graduates who concentrate in an occupational studies curriculum while in high school. Occupational studies are part of the broader field of career and technical education (CTE), which also includes general labor market preparation and family and consumer sciences education. Historically, CTE (formerly known as vocational education)[1] has been treated as a separate component of the overall high school curriculum, providing low-achieving students with courses that prepared them for careers in non-college jobs (Hyslop-Margison 2001; Tanner and Tanner 1980). These courses, often taken at the expense of more advanced academic courses, typically provided little academic content or even challenge to students. Over the past few decades, however, there have been a number of policy and economic changes that have altered the scope and delivery of CTE: high schools have increasingly adapted their curricula to meet the demands and requirements of state and national testing regimes, most notably those imposed by the No Child Left Behind (NCLB) legislation; CTE programs have been increasingly expected to integrate academic skills and concepts with occupational ones so that students are prepared for additional postsecondary training as well as the workforce; and the transition from a manufacturing-based economy to a service- and technology-based one has placed a heightened premium on communication, computer, and quantitative skills.

With these changes taking place, new cohorts of CTE students may increasingly resemble their academically focused peers in coursetaking patterns, high school experiences, and postsecondary destinations. Indeed, this process may already be reflected in the most recent groups of CTE students. To examine this possibility, this report uses national longitudinal datasets that track the secondary and postsecondary experiences of three cohorts of high school graduates—the classes of 1982, 1992, and 2004. These three studies provide information on the depth and extent of CTE participation, both independently and in relation to academic subjects; on the personal background of graduates; on high school experiences and achievement outcomes; and on initial postsecondary education and employment experiences. Key to the usefulness of this study compared with other studies of trends in CTE (Levesque et al. 2008; Silverberg et al. 2004) is the use of detailed high school transcript data that enables precise descriptions of CTE coursetaking.

This report begins with a brief overview of changes in the CTE policy environment and the economy between 1980 and 2006. This will be organized temporally around the three cohorts

[1] In 1998, the reauthorization of the Carl D. Perkins Vocational and Technical Education Act began the process of replacing the term "vocational" with CTE to emphasize the difference between new curricula that integrate academic and occupational skills and older curricula that focused on workplace preparation for non-college jobs. In addition to changing use among government agencies (e.g., Levesque et al. 2008), professional associations and research organizations have also revised their names to reflect the CTE nomenclature (e.g., the National Centers for Career and Technical Education and the Association for Career and Technical Education).

to provide context for interpreting the results. In the next chapter, the three data sets and key measures will be described. Following this, the findings for five topic areas will be presented in separate chapters: participation in CTE, academic and occupational coursetaking, math achievement, initial postsecondary education, and initial postsecondary employment experiences. The report will conclude with a brief discussion of the key findings.

Background

Three Cohorts and Three Different Environments

Since 1972, the National Center for Education Statistics (NCES) has sponsored a series of longitudinal studies that examine the experiences, attitudes, and achievement of high school students and their transition to young adulthood, postsecondary education, and work.[2] This report uses data from the following three studies in this series:

- The High School and Beyond (HS&B) Longitudinal Study of 1980 Sophomores;
- The National Education Longitudinal Study of 1988 (NELS:88); and
- The Education Longitudinal Study of 2002 (ELS:2002).

The three studies represent the graduating classes of 1982, 1992, and 2004. Across the three decades during which these studies took place, there were a number of educational policy and economic changes that have direct implications for students who concentrate in CTE. This section briefly details these changes as a backdrop for understanding change and stability in CTE at the student level—the focus of the present report.

The Class of 1982

Secondary education during the bulk of the 20th century was organized and largely functioned as a way to "sort" students into different life pathways, with the major educational distinction being between a college-bound and non-college-bound pathway. High school vocational education served to educate non-college-bound students with skills and training for the challenges that they would face when taking jobs in local factories, farms, and offices. Students were to be selected and narrowly oriented to industrial or agricultural training (Hyslop-Margison 2001). At the same time, postsecondary apprenticeships, industrial training programs, and college programs provided further education for occupationally oriented students, particularly through agricultural and mechanical schools whose historical mission was occupational training (versus not liberal arts studies that were often the province of major public universities or private colleges). Educational extension programs supported this postsecondary system by pushing agricultural training to rural areas where higher education access was limited.

[2] The first study in the NCES series was the National Longitudinal Study of 1972 (NLS:72). Results from this study are not examined as part of the current report because high school transcripts were not collected from its sample of seniors. Therefore, a reliable and cohort-comparable determination about CTE participation is not possible from the NLS:72 data.

In both the secondary and postsecondary settings, the educational model was one of training for efficiency and productivity in specific industrial, agricultural, and, less frequently, service jobs (including homemaking).

Over time, and particularly as World War II facilitated increasing complexity in the labor market, the model of vocational training expanded to incorporate a broader set of occupations and to involve notions of long-term career preparation as well as more immediate skills development (Tanner and Tanner 1980). Organizations such as the National Education Association began to advocate for broad vocational curricula to develop employable skills among a range of students. During this period, and through the present day, arguments about the relationship between academic and occupational training—whether they should or should not be integrated, with the former being the commonly accepted position today—developed in full.

The post-war economic environment that saw American industrial and financial dominance through the 1960s experienced sudden shocks in the 1970s, involving substantial changes to the international monetary regime, increased insecurity in energy supplies, and periods of low growth and high inflation (including economic recession during the first years of the 1980s). These experiences and the economic changes they ushered in, coupled with the revitalization of strongly competitive national economies in Europe and Japan, culminated in an overriding concern about U.S. student outcomes compared to international performance. The National Commission on Excellence in Education published the most high-profile report, *A Nation at Risk* (1983), exhibiting this concern. The report challenged the presumption that American schools could keep pace with a changing national and global economy and argued for increased academic course requirements for high school graduation as a remedy (Johnston and Packer 1987).

The high school class of 1982 completed their secondary education and entered postsecondary work and educational life during this period of economic and educational transition. The concerns that prompted *A Nation at Risk* and other reports of its kind resulted in an increased emphasis on academics and, for CTE in particular, an increased focus on incorporating academic with occupational content. Nevertheless, the class of 1982 experienced most of their high school curriculum and any CTE under the older historical regime of occupational skills training and career preparation, with less emphasis on achievement in academic subjects. This group of graduates emerged as one of the last to experience a clear and sharp distinction between academics and career preparation, and emerged at the end of a difficult social, economic, and political period.

The Class of 1992

Following the economic challenges of the 1970s and new education policy efforts in the wake of *A Nation at Risk*, studies and reports continued to emphasize academic requirements while extending critiques of the weak workplace skills that students were obtaining through their education (Castellano, Stringfield, and Stone 2002; Murnane and Levy 1996; Secretary's Commission on Achieving Necessary Skills 1991). Like historical debates about education in general and CTE specifically, these debates helped produce new legislation mandating more

academic skills training and introducing novel CTE programs. This new legislation, however, instituted greater changes than prior efforts.

For most of the 20th century, federal legislation played a limited role in influencing actual CTE practices, because federal funds supplied to schools were generally minor. Federal involvement in CTE has roots as far back as the Smith-Hughes Act of 1917, but a significant change in direction and involvement emerged with the passage of the Carl D. Perkins Act of 1990, commonly referred to as Perkins II. (The first Carl D. Perkins Act, or Perkins I, was passed in 1984, but had a more restricted scope and substantially less funding.) Perkins II required vocational programs receiving federal funding to place greater emphasis on both work experience and academic coursetaking. Technical preparation programs (or "tech prep"), envisioned as structured high school-to-community college educational sequences, were a major component (Parnell 1985; Prager 1994). The last 2 years of high school would focus on academics in applied and work-related settings, followed by enrollment in a 2-year postsecondary school, where students would develop the in-depth technical knowledge required for full-time work. Under this model, postsecondary courses would be aligned with high school courses. The academic emphasis in high school was also to be realized by integrating academic material with vocational applications.

At the same time, the economic climate of the 1980s and early 1990s supported trends seen from the 1970s, particularly in a move away from labor-intensive industrial manufacturing and toward both personal/consumer service and professional service occupations. In contrast to the 1970s, however, the fall of Soviet-backed communism between 1989 and 1991 was accompanied by a revitalization of American economic preeminence, although international economic integration (i.e., globalization) also continued to grow and present both threats and opportunities to U.S. industries.

Thus the high school class of 1992, as did the class of 1982, graduated toward the end of one economic and political era and the beginning of another. Educational policy and economic opportunities had both shifted substantially, yet the federal government had only recently begun to direct significant resources to CTE through the passage of Perkins II in 1990. The class of 1992 also came of age well after the mid-1980s push toward increased academic requirements for high school graduation, which might be expected to have affected both occupational and non-occupational students.

The Class of 2004

Federal education legislation continued to play a large role in shaping CTE in the 12 years between 1992 and 2004. Perkins II was followed in 1994 by the School to Work Opportunities Act (STWOA). STWOA continued to emphasize academic goals but placed additional emphasis on providing high school students with relevant work-related experience, career awareness activities, and other work-based involvement. Career days, internships, school-based enterprises, and job shadowing were some of the work-related activities STWOA stressed.

Four years later, in 1998, Congress reauthorized Perkins II as Perkins III, with a number of modifications. Perkins III sought flexibility so that the legislation could accommodate the

varied educational reform goals that states were trying to implement. The Act funded programs that, among other things, involved parents and employers in vocational education efforts, developed the use of advanced technology in training, and provided professional development for teachers and administrators. Continuing emphasis was placed on ensuring that vocational students received rigorous academic instruction while at the same time providing students with work-related experiences.

In addition to Perkins III, the No Child Left Behind (NCLB) Act was signed into law in 2002. NCLB codified the move toward test-based accountability, particularly for schools serving students in grades 1 through 8. NCLB principles would find expression in a subsequent reauthorization of the Perkins Act (see below), but this legislation came too late (and was not specifically geared to reshape CTE) to affect the experiences of the 2004 class of graduates, most of whom were finishing their sophomore year as NCLB was instituted.

The economic climate shaping the class of 2004 was perhaps the brightest experienced by any of the three cohorts studied here, with substantial economic growth in the late 1990s and generally stable labor markets and low inflation through 2004. The political climate was strongly shaped by attacks by radical Islamic terrorists on September 11, 2001, but unlike some prior political foci (e.g., concerns about the Soviet Union's technical advancements in the 1950s, or the rise of re-industrialized Germany and Japan in the 1980s), this element of broader societal concern did not result in substantial organizational or funding changes to the educational system.

Current CTE Policy

A final word is worth mentioning about educational policy changes subsequent to 2004. Perkins III was reauthorized by Congress in 2006, as Perkins IV. Following the passage of the NCLB Act, Perkins IV emphasizes even further the academic outcomes and the reporting and measurement of CTE outcomes. For example, Perkins IV frequently uses terms such as "rigorous and challenging" to describe the academic and technical instruction that it is designed to support; other language explicitly addresses the mathematics and science content that is often necessary for successful technical training. It also requires states to provide indicators of their postsecondary CTE program activities. Additional differences include greater emphasis on training and professional development for teachers and administrators and a reemphasis on the linkage between postsecondary and secondary curriculum such as requiring states to consult with postsecondary practitioners in developing secondary CTE programs.

Governed by Perkins IV, the current federal climate supports a wide variety of both recurring and novel CTE programs and activities within the broader policy context of accountability (principally state reporting of CTE outcomes) and the backdrop of concerns about preparation for high-skill jobs in a globally competitive economy. Despite some changes, the policy goal that emerged in the early and mid-1980s—increasing academic achievement for CTE students—remains a focus of educational policy.

Goals and Organization of the Current Report

As noted, the goal of the current report is to examine change and stability across three decades among high school graduates with an investment in occupational studies. In particular, the report will try to answer the following questions:

1. Has participation in CTE changed over time? Has the composition of graduates who focus on occupational coursetaking changed over time?

2. What specific changes in CTE coursetaking can be observed? How do these changes relate to changes in academic subject coursetaking?

3. Have there been any changes in the academic achievement of occupational investors over time? How have any changes compared to the academic achievement of noninvestors?

4. What are the initial postsecondary educational and employment experiences of occupational investors, and how have they changed over time?

Because of the shared content of the three studies that form the basis for investigation, special focus will be placed on the mathematics coursetaking and achievement of CTE students. These areas are both available for in-depth study across the three studies, and they represent particular areas of interest amidst an increasingly technological global economic environment.

The rest of the report is organized into 7 chapters (chapters 2 through 8). Chapter 2 provides an overview of the data and methods used in the report. This chapter describes the general design and properties of the data that form the basis of this report and discusses the sample selected from each of these studies for these analyses. Because high school transcripts are the basis for the main variables, the organization and coding of CTE courses is described as well. Finally, chapter 2 discusses the decisions that result in the two major classifications used throughout the report: occupational investment and academic orientation.

Chapters 3 through 8 present the substantive findings in five topic areas: participation in CTE, academic and occupational coursetaking, math achievement, postsecondary education, and postsecondary employment. Chapter 3, Participation in CTE, includes summary information about occupational coursetaking, occupational area concentration, academic subject coursetaking, and breakdowns of the percentage of graduates in each occupational coursetaking group and academic orientation group by student characteristics such as sex, race, and socioeconomic status, and by school attributes such as urbanicity and student body size.

Chapter 4, Academic and Occupational Coursetaking, consists of two parts. The first presents information about the academic courses taken by occupational investors and noninvestors, with a special focus on math and science, as well as information on the most common CTE courses taken by all graduates. The second part of chapter 4 consists of an analysis of whether CTE coursetaking involves “trading” or substituting CTE courses for academic courses.

Chapter 5, Math Achievement, documents changes in the math achievement scores of occupational investors and noninvestors. Because HS&B does not contain separate mathematics achievement scores, only NELS:88 and ELS:2002 (1992 and 2004 graduates, respectively) will be used in these comparisons.

Chapter 6, Postsecondary Education, analyzes senior-year educational expectations and initial postsecondary education enrollment. This chapter and chapter 7 use data obtained about experiences in the first 2 years after graduation, because the full postsecondary record is not available for 2004 graduates at the current time. However, the first 2 years after graduation are a key transition period between high school completion and eventual postsecondary outcomes.

Chapter 7, Postsecondary Employment, examines senior-year occupational expectations, senior-year work goals, and senior-year work experiences, in addition to information about first job type and number of months employed since graduation (for non-college attendees). Also, because certain occupational areas of CTE have traditionally been dominated by males or females, this chapter will examine the proportion of males and females whose first job is in a field majority-occupied by the opposite sex.

Finally, chapter 8 concludes the main part of the report with a brief discussion of the key findings.

Appendices provide additional information about the design and conduct of the three studies; the analysis methods used in the report; a glossary of variables; tables for the standard errors (measures of precision) of the estimates reported in the main text; findings from a multivariate achievement analysis that extends previous work on the class of 2004 to the class of 1992; and a listing of course codes in CTE, occupational, and academic subjects.

2. DATA AND METHODS

This chapter describes the overall purpose and design of the three studies used as the basis for this report, the samples selected from each study, the high school transcript data, the course taxonomy that identifies academic and CTE courses, and the definitions of the principal organizing variables used throughout the report (occupational investment and academic orientation).

Data

The three primary sources of data for the estimates presented in this report are part of a series of high school longitudinal studies conducted by the National Center for Education Statistics (NCES, part of the Institute of Education Sciences of the U.S. Department of Education). The three NCES studies are High School & Beyond Longitudinal Study (HS&B) of 1980 Sophomores;[3] the National Education Longitudinal Study of 1988 (NELS:88); and the Education Longitudinal Study of 2002 (ELS:2002).

All three studies share similar designs that enable cross-study comparability; three features are key. First, all three studies began with a base-year cohort and subsequently surveyed that cohort at 2-year intervals, for varying numbers of follow-ups. The base-year cohorts of HS&B and ELS:2002 were each a nationally representative sample of high school sophomores; the base-year cohort for NELS:88 was a nationally representative sample of 8th-graders, but the sample was re-surveyed and augmented in the subsequent wave to obtain a representative sample of sophomores. Each study resurveyed its sample members in the spring term of the senior year of high school, as well as 2 years after graduation (the number and timing of other follow-ups varied among studies). In addition, each study gathered and systematically coded high school transcripts from a portion of senior-year sample members. Therefore, all three studies have survey data with matching time frames.

Second, both NELS:88 and ELS:2002 survey designs and instruments were constructed to closely match, and at times replicate, procedures and items used in HS&B. Further, variables constructed for released datasets were designed to replicate composite variables available in each previous study. This includes constructed items such as mathematics test scores (available for NELS:88 and ELS:2002), attitudinal questions, questions about educational and occupational expectations, and questions about postsecondary experiences. In the high school transcript studies, coding of transcript courses and course information (e.g., standardized grade earned) followed similar procedures across HS&B, NELS:88, and ELS:2002, with an eye to facilitating reliable historical comparisons.

[3] HS&B consists both of a sophomore sample, which is the basis of the current study's estimates, and a sample of seniors. Both began in 1980, but high school transcripts (required for the current study) were gathered only for the sample of sophomores. In addition, the first study in this series, the National Longitudinal Study of 1972, was not used in this report because no high school transcripts were collected from its sample of seniors.

Third, each study enables the creation of an analytical sample representing a high school graduating class. For NELS:88 and ELS:2002, additional sample members were added to the senior-year follow-ups to ensure a nationally representative grade cohort of 12th-graders. For ELS:2002, this means that additional seniors were added to obtain a representative sample of the senior class of 2004; for NELS:88, additional seniors were surveyed to obtain a nationally representative sample of the senior class of 1992. HS&B was not "freshened" in a similar manner, but available variables on the HS&B dataset allow filtering the original sophomore cohort to identify a similar group of eligible seniors (see appendix A for more information). With appropriate filters for graduation dates, these senior-year samples are representative of the graduating class of their respective year.

Specifically, the analysis sample from each survey was restricted to sample members who were public high school graduates in each senior year (regardless of when originally surveyed) and had a complete set of transcripts. Although each study includes students in both public and private high schools, all analyses in this report are based on public school students for whom the CTE legislation is most applicable. High school graduates were defined as sample members who graduated with an honors or standard diploma no earlier than September of the year prior to senior year (thus excluding a small number of early graduates) and no later than the end of the summer (August 31) of their graduating year (1982 for HS&B, 1992 for NELS:88, and 2004 for ELS:2002 graduates). A complete transcript was defined as one that recorded 16 or more Carnegie units,[4] with a positive, nonzero number of credits completed in English. These criteria for defining the analysis samples also served to make them comparable across the different years and studies.

In the following sections, each study is described in further detail, and the specific samples used in the current report detailed. For additional information about each of the studies, see appendix A.

HS&B

The HS&B longitudinal survey was first administered in 1980 to a stratified, nationally representative sample of approximately 30,000 high school sophomores and 28,000 high school seniors from more than 1,000 high schools. Follow-up surveys were administered in 1982, 1984, 1986, and 1992. This report used the 1980 sophomore cohort sample. As part of the first follow-up study, conducted in 1982, high school transcripts were collected for a probability subsample of 18,500 members of the 1980 sophomore cohort. For this report, the demographic characteristics of the 1982 graduates were drawn from the first follow-up data file, and their coursetaking information was drawn from the transcript data file; information about initial postsecondary experiences comes from the second follow-up conducted in 1984. The analysis sample included approximately 6,500 sophomores who graduated from public high schools in 1982 and had complete transcripts.

[4] A Carnegie unit is equivalent to a course taken every day, one period per day, for a full school year.

NELS:88

The NELS:88 base-year survey was administered in 1988 to about 24,000 8th-graders in more than 1,000 schools. The first and second follow-ups revisited the same sample of students in 1990 and 1992, when most of the 1988 8th-graders were in the 10th grade and 12th grade, respectively; then for the third and fourth times in 1994 and 2000, which were 2 and 8 years after their scheduled graduation from high school. Unlike HS&B, for each in-school follow-up (i.e., 1990 and 1992), the student sample was "freshened" or augmented to obtain a representative, cross-sectional grade-cohort (i.e., 10th-graders in 1990 and 12th-graders in 1992). In addition, as a part of the second follow-up, high school transcripts were collected for all students attending a subset of second follow-up schools selected for the transcript study. For this report, the demographic characteristics of 1992 high school graduates came from the NELS:88 second follow-up data file, and their coursetaking information from the survey's transcript data file. Information about initial postsecondary experiences comes from the third follow-up conducted in 1994. The analysis sample was drawn from the transcript sample. Of the students in the transcript file, about 7,200 were identified as public high school graduates with complete transcripts.

ELS:2002

ELS:2002 is an ongoing, nationally representative study of approximately 15,400 students who were 10th-graders in 2002. Since the base-year interview in 2002, sample members have participated in two follow-up surveys: the first follow-up took place in the spring of 2004 when most sample members were high school seniors and the second follow-up took place in 2006 when most were 2 years out of high school. Additionally, high school transcripts were collected from sample members who participated in either the base-year or first follow-up wave. Demographic information used in this report comes from the first follow-up data file; transcript information from the transcript file; and initial postsecondary experiences from the second follow-up survey. Of the approximately 10,500 public school respondents for whom transcripts were obtained, about 8,600 were identified as public high school graduates with complete transcripts.

Subject Area Classification

The high school transcript studies collected and coded course-by-course information from each sample member, including information such as course title, course grade, credit earned, year in which course was taken, and grade in which course was taken. Credits earned were standardized across transcripts, and courses with a failing grade assigned zero credits. Course titles were also coded into a standard classification scheme, the Classification of Secondary School Courses (CSSC) codes.

The CSSC codes are a set of six-digit numerical codes originally developed for the transcript component of the HS&B study. Since the collection of transcripts for HS&B, many changes have occurred in the high school curriculum, most notably the addition of computer/technology-based courses and increasing diversification among advanced courses, such as Advanced Placement (AP) and International Baccalaureate (IB) courses for older subjects. The CSSC codes were updated for NELS:88 and ELS:2002 to accommodate these new

courses appearing on transcripts. Because the CSSC codes represent a coding system (i.e., to identify the same courses even if transcripts use varying titles) and not an organizing scheme (i.e., defining which courses are part of the same subject or area of study), the National Assessment of Vocational Education worked to develop the Secondary School Taxonomy (SST) in 1987 as a means to classify subject areas using the CSSC codes. This taxonomy was itself expanded and updated in 1998 (Bradby and Hoachlander 1999), and the CTE portion updated in 2008 (Bradby and Hudson 2008).

At its highest (most aggregated) level, the SST divides high school coursework into four distinct curricula: academic, career and technical education (CTE), enrichment/other, and special education. Special education courses are not included in this analysis. Enrichment courses include subjects such as physical education, religion, and military training; they are summarized initially but are otherwise not examined in the report. The academic curriculum contains six subject areas: mathematics, science, English, social studies, fine arts, and non-English (i.e., foreign) language. Finally, the CTE curriculum contains three subject areas: family and consumer sciences education (FCSE), general labor market preparation (GLMP), and specific labor market preparation (SLMP) or occupational education. FCSE courses prepare students for family and consumer roles outside the paid labor market. GLMP courses teach general employment skills that are not specific to one occupational area, such as keyboarding/typing, basic computer literacy, and general work experience courses. Occupational (SLMP) courses are designed to prepare students for work in a specific occupational field or for a related program of study in college.

The SST contains a taxonomy of occupational courses, but for the purposes of this report, which include maintaining consistency with studies of postsecondary career choices, a career cluster taxonomy was employed instead (Bradby and Hudson 2008; Hudson and Laird 2009). Subject areas in this taxonomy are mutually exclusive. Therefore, a course that is classified as an academic course cannot be classified as a CTE course (or vice versa). The career cluster taxonomy used in this report organizes occupational courses into one of 11 areas by combining some less-common courses into a single area (particularly public services courses, which include education, legal, and public safety courses) and separating other courses into separate areas (such as separating engineering technologies from architecture, construction, and science technology). The career cluster taxonomy comprises the following course areas:

1. Agriculture and Natural Resources;
2. Architecture, Construction, and Science Technology;
3. Business;
4. Communications and Design;
5. Computer and Information Science;
6. Consumer and Culinary Services;
7. Engineering Technologies;
8. Health Sciences;
9. Manufacturing, Repair, and Transportation;
10. Marketing; and
11. Public Services.

The courses and course codes that comprise these subject areas are listed in appendix D. Because FCSE and GLMP courses are not linked to specific occupational and/or postsecondary pathways, this analysis focuses on the occupational component of CTE. Without an explicit connection to occupational programs of study encouraged in the recent CTE legislation, FCSE and GLMP courses are less central in understanding key trends in career and technical education.

Defining Occupational Investment and Academic Orientation

The main organizing variables for most tables in this report rely on classifications of graduates by (1) occupational investment and (2) academic orientation (academic or general education). This section describes the choices available in constructing these two variables and the definitions used in this report. Substantive discussion about occupational investment and academic focus is presented in chapter 3; the focus here is on definitional and methodological issues.

Occupational Investment

Student involvement in CTE can be measured in a variety of ways. Participation in specific CTE programs, enrollment in certain types of high schools, and coursetaking experiences may all be used, independently or jointly, to define CTE students. Programmatic participation or enrollment in high schools identified as vocational or technical has the advantage of being a straightforward, yes-or-no indicator of student involvement. However, variations across schools, districts, and states in the definitions, requirements, and practices of CTE programs or high schools makes it very difficult to ensure that a common standard for CTE student involvement is being applied. Gathering the information necessary to make such judgments would be an extensive task. In the context of the broader scope of the NCES high school longitudinal studies, such an effort was not made, and so information about schools' CTE programs and high school classification is limited to general questions posed to administrators or counselors (such as, "does your school offer a technical preparation program?") or inclusion of existing state-provided information about high school type (recorded in NCES' Common Core of Data).[5] Therefore, these two sources of information cannot be used to provide reliable judgments about individual student participation in CTE.

Career and technical education coursetaking data may provide much greater detail about student participation in CTE. A list of specific courses, as is found on transcripts, enables the construction of measures that mark fine distinctions in the intensity of CTE involvement. The principal disadvantages with coursetaking information, however, are the difficulty of gathering and standardizing transcript information, and the lack of information about what other educational supports a CTE student might be receiving as part of his or her schooling (e.g., whether the student is engaged in a school-based business enterprise, or whether the student participates in [noncredit] apprenticeships or work training).[6] The first of these disadvantages has

[5] The National Longitudinal Study of Youth in 1997 (NLSY-1997) provides a student-based, questionnaire-derived approach to determining CTE participation from programmatic involvement (see, e.g., Stone and Aliaga 2003).

[6] An additional disadvantage is lack of information about the quality or content of labeled courses. Transcript information, by definition, includes only course titles. These titles may represent courses with varying content, teaching approaches, and instructional efficacy. In the context of occupational concentration, where the purpose is to

been addressed in NCES' high school longitudinal studies: extensive efforts were made to collect high school transcripts directly from schools and school systems, to classify courses using standard coding schemes (the CSSC codes, discussed above), and to standardize the grades and credit measures provided on transcripts so that courses taken by students from different schools, districts, and states can be compared. Although the second issue, programmatic participation, is not explicitly captured by transcript information, some such participation is codified as earned credits and would, in fact, be captured on transcripts. Further, most programs involve substantial coursetaking components, so that coursetaking represents most of the program's commitment. These considerations make transcript data among the most valid and reliable indicators of CTE participation.

The fine degree of data obtainable from transcripts presents other challenges, however. Students may be classed as CTE participants or occupational investors based on any given number of credits chosen, or CTE credits can be used in continuous form, without reference to a level that marks CTE versus non-CTE involvement (e.g. Hoachlander, Kaufman, and Levesque 1992). The latter may be most appropriate when analysis seeks to understand CTE as a component of a set of factors affecting secondary and postsecondary achievement and attainment—for example, when conducting a regression analysis whose procedures can use the full range of student variation in CTE coursetaking in its equations. For descriptive analysis, however, continuous measures may be problematic, because their representation as averages can mask substantial variation within the population and overstate the influence of outliers (i.e., particularly high or particularly low values). In addition, continuous measures that do not reference an agreed-upon level of CTE participation are less well suited to answering questions about explicit levels of participation and their influence. Policymaking and planning require common standards that can be measured across groups and jurisdictions, and here specific, concrete levels of coursetaking are most useful. Finally, a continuous measure of CTE coursetaking may neglect a crucial substantive distinction between students who take similar numbers of CTE courses: some students may spread CTE coursetaking among numerous types of CTE courses, while other students may concentrate their studies in a specific field. Concentration in a field of study may be particularly important for postsecondary work opportunities. A single continuous measure does not capture that distinction.

In light of these considerations, this report measures CTE participation on the basis of transcript coursetaking and uses a comprehensive categorization of CTE involvement that (a) distinguishes levels of involvement overall and (b) distinguishes diffuse coursetaking from focused coursetaking in specific fields of study. Because this categorization is based on occupational coursetaking in the 11 areas described earlier, it also distinguishes occupationally relevant coursetaking from general labor market courses that may be as valuable to college-bound graduates as to workforce-bound graduates and from family and consumer sciences courses that may be of general interest to many students, and which may include coursetaking among students who do not plan to enter the labor force.

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identify a set of similar courses to distinguish occupational specializers from those without such specialization, some of these individual course content differences may be less salient. However, the impact of such variation on classifications of CTE participation is not currently well understood.

Therefore, graduates are placed in one of four occupational coursetaking categories, which are classified into two broad "investment" groups, as shown in exhibit 1.

Exhibit 1. Occupational Investment Categories

Noninvestor
1. **Nonparticipant**: fewer than 1 total occupational credits earned 2. **Sampler**: 1 to fewer than 3 total occupational credits
Investor
3. **Explorer**: 3 or more total occupational credits, but no single occupational area with 3 or more credits 4. **Concentrator**: 3 or more total occupational credits in at least one area (i.e., may earn 3 or more credits in more than just one occupational area)

In chapter 3, detailed breakdowns of total CTE coursetaking, total occupational coursetaking, and occupational coursetaking concentration will be provided as a prelude to breakdowns by the occupational coursetaking categories listed above. Subsequent chapters will use the four-category classification in presentation of results.

These categories and their labels derive from prior studies in CTE. Arum and Shavit (1995) used the terms "samplers" and "nonparticipants," in addition to "concentrator." "Explorer" and the broad groupings "noninvestor/investor," in addition to the same definition of occupational concentrator used in the current report, are terms used in the 2004 National Assessment of Vocational Education report (Silverberg et al. 2004). The three-credit definition of occupational concentration is the historical definition used in several key NCES reports (Levesque 2003a, 2003b; Levesque et al. 1995, 2000, 2008), and therefore its use allows comparisons to results from other studies using the same definition. The main alternative definition for occupational concentration is a two-credit definition.[7] This definition may be appropriate because of the degree to which occupational and academic coursetaking is being increasingly integrated, and the degree to which occupational and academic skills are both seen as valuable, meaning that occupational concentration alone (i.e., even three or more credits in one area) may not be enough to signal potential employers about the level of preparation of graduates. Nevertheless, as will be seen in chapter 3, the spread of occupational coursetaking among more types of students means that such a two-credit definition likely includes many

[7] Other values for occupational concentration may be viable, but suffer additional problems compared with either the two- or three-credit definition. Fractional definitions (e.g., 2.5 credits) could be a good alternative, but because the basic unit of instruction is a daily, year-long credit equivalent (the Carnegie unit), the opportunity for individual students to obtain fractional credits to meet this definition may be limited, and employers or postsecondary schools may find it less than appealing as a standard. Second, as will be shown in chapter 3, a higher credit threshold such as four credits implies that occupational concentrators must decide to pursue concentrations before entering ninth grade, or otherwise take multiple courses in a single area in a single year, which could be difficult given time constraints or the availability of courses.

students who took two courses in a particular area out of interest or coincidence, rather than an intent to specialize or because of programmatic CTE involvement.

Academic Orientation

Academic coursetaking has also been used to distinguish CTE participants from nonparticipants. Traditionally, students have been divided into three groups: those with an academic (college-bound) focus, those with a general education focus but with a vocational focus, and those general education students without a vocational focus. Academic focus graduates would be those who earned a specified number of credits in each of several academic subjects; those who did not would be assigned a general education focus. Depending on the purposes of research or reporting, those with both an academic focus and occupational concentration, while expected to be few, could be placed in either the academic group or the occupational concentration-with-general education group.

However, as indicated, academic orientation is not distinct from occupational concentration—a graduate could fall into both groups. The distinction also has less meaning as academic requirements for graduation have increased (requiring many occupational concentrators to increase their academic coursetaking) and occupational coursetaking has become more widespread (introducing more traditional "academic focus" students into occupational coursetaking and concentration), as chapter 3 will show. Finally, comparing graduates only in their level of occupational investment may miss critical differences between occupational coursetaking investors with an academic focus and those with a general education focus.

Therefore, in the current report, most tables report results that identify both occupational investment and academic orientation, yielding eight groups: four groups of occupational coursetaking involvement crossed by academic focus or general education focus. As chapter 3 will show, most occupational investors are general education students, particularly in earlier graduating cohorts, and most noninvestors are academic focus students. However, the increasing overlap in these groups means that, in 2004, there were substantial proportions of graduates in the nontraditional groups. Distinguishing among these groups allows examination of whether graduates in these growing categories have different characteristics than graduates of traditional groups.

To define academic orientation, we use the commonly cited "New Basics" standards outlined in the influential *A Nation at Risk* report (National Commission on Excellence in Education 1983). These requirements are

- 4 credits in English;
- 3 credits in math;
- 3 credits in science; and
- 3 credits in social studies.

Other standards might be used to defined "academic focus," but this definition is a widespread and historically significant one. However, one notable consequence of using this definition is that, because of its influence on policy and the timing of its publication between the 1982 graduating class and the 1992 and 2004 graduating classes studied here, there is a marked

increase in the percentage of graduates meeting this requirement between the 1982 and 1992 classes. While 14 percent of graduates in 1982 met the academic focus requirements, fully 47 percent met them in 1992, although this declined to 40 percent in 2004. Another standard—developed by Levesque et al. (2008) and reflecting preparation for 4-year college enrollment—is used in chapter 4 to help provide another perspective on the academic orientation of graduates. This standard requires fewer total credits in science and social studies, but adds credit requirements in foreign language and specifies that credits in math, science, and social studies must include certain higher-level courses. A full description of the 4-year college preparation indicator is provided in chapter 4.

Analytical Methods

All numerical values in this report are estimates that account for the complex sampling characteristics of each of the studies. Weights were employed which accounted for differential probability of selection into the sample and adjusted for nonresponse (i.e., failure to answer questionnaires or otherwise participate once chosen as an eligible sample member). First follow-up transcript weights were used in all chapters: with the filter for graduates with complete transcripts, these weights adjust the estimates so they represent the national population of high school graduates in each respective study year (1982, 1992, and 2004). For parts of chapters 6 and 7 addressing experiences in the 2 years after graduation, second follow-up transcript weights were used, and estimates from this chapter likewise represent the national population of high school graduates. See appendix A for the specific names of weights used in the analysis for each study.

In addition, analysis procedures used information about sample design to calculate measures of the precision of numerical values such as means or percentages. These measures of precision are called standard errors and help identify when two or more estimates cannot be distinguished because of uncertainty about the true value of the estimates. The analysis procedure used to calculate standard errors was the method of balanced repeated replication (BRR). See appendix A for more information on BRR.

Because of the uncertainty surrounding estimates, some apparent differences between numerical values may not represent true differences in the population of students from which the estimate is drawn. Therefore, tests for the statistical significance of differences are required to ensure that any given difference is likely a product of more than sampling variation. All comparisons reported in the text have been tested to ensure statistical significance, unless a numerical value is reported individually or the text otherwise states there was no statistically significant difference observed. The statistical test used was Student's *t* test. The formula for this test is provided in appendix A. Standard errors for tables discussed in the text are provided in appendix B.

Most analyses in this report are bivariate cross-tabulations (with filters for specific subpopulations such as academic focus graduates or non-college attendees, when appropriate). Some analyses reported in chapters 4 and the analysis in appendix C use regression techniques to estimate the association between an independent and dependent variable. These techniques are described in the sections presenting those results, and further detailed in appendix A.

Because of the large numbers of estimates created by multiple groups and variables in any given table, not all statistically significant differences or substantively interesting comparisons can be discussed. To help standardize what findings are discussed, the following discussion sequence is used for each table: (1) first, changes over time within each occupational coursetaking group are discussed, with differences in trends within groups and across academic focus and general education graduates noted; (2) then each occupational coursetaking group is compared with others within each year, with text noting whether patterns holding in earlier cohorts continue to hold or change in later cohorts.

3. PARTICIPATION IN CAREER AND TECHNICAL EDUCATION

Given the changing federal role over time, and the changing political and economic contexts in which high school students complete their coursetaking, the major question concerning participation in CTE involves how CTE and occupational coursetaking have changed. In addition, the relationship between academic and occupational coursetaking may have changed over time, as may have the types of graduates involved in CTE. This chapter addresses these questions by describing high school graduates' participation in CTE courses and the background characteristics of occupational concentrators and nonconcentrators. Overall numbers of earned credits in academic, CTE, and occupational courses are presented first, followed by categorical breakdowns of occupational investment categories and academic orientation groups. Finally, the sociodemographic characteristics of graduates and the characteristics of schools they attended are presented, to provide a picture of types of students at different levels of occupational coursetaking involvement.

Occupational and Academic Credits Earned

- ***High school graduates earned, on average, about 4.5 more credits in 2004 than in 1982; this includes an increase in academic credits earned.***

Looking across the three cohorts, the average total number of credits high school graduates earned increased over time in two almost equal increments: 2.3 credits between 1982 and 1992, and 2.2 credits between 1992 and 2004 (table 1). Students not only took more courses, they took more academic courses: 1982 seniors earned 15 academic credits, compared with 17 among 1992 seniors and 19 among 2004 seniors. Over these two decades, graduates earned more credits in all academic areas except English (i.e., in mathematics, science, social studies, fine arts, and non-English languages). These changes are consistent with the policy changes recommended in 1983's *A Nation at Risk*, as discussed in chapter 3, and evidence from other sources (e.g., Shettle et al. 2007).

Table 1. Average number of credits (Carnegie units) earned by public high school graduates, by subject area: 1982, 1992, and 2004

Total and subject area	1982	1992	2004
Total credits earned	21.7	24.0	26.2
Total career and technical education (CTE) credits earned	4.6	3.9	3.8
Family and consumer sciences education	0.5	0.4	0.3
General labor market preparation	1.0	1.0	0.9
Occupational area credits, total	3.0	2.4	2.6
Agriculture and natural resources	0.2	0.2	0.2
Architecture, construction, and science technology	0.1	0.1	0.1
Business	1.0	0.7	0.5
Communications and design	0.2	0.2	0.3
Computer and information science	0.1	0.2	0.4
Consumer and culinary services	0.2	0.2	0.2
Engineering technologies	0.2	0.2	0.2
Health sciences	0.1	0.1	0.1
Manufacturing, repair, and transportation	0.7	0.4	0.3
Marketing	0.1	0.1	0.1
Public services	0.1	#	0.1
Total academic credits earned	14.6	17.4	19.2
English	4.0	4.2	4.3
Mathematics	2.7	3.3	3.6
Science	2.3	3.0	3.3
Social studies	3.2	3.5	3.9
Fine arts	1.5	1.7	2.1
Non-English language	1.0	1.8	2.0
Total enrichment credits earned[1]	2.6	2.7	3.2

Rounds to zero

[1]Enrichment credits include courses such as physical education, religion, and military education.

NOTE: A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

- ***Total credits earned in CTE courses and occupation-specific courses declined between 1982 and 1992; no differences were observed between 1992 and 2004.***

The number of CTE credits that graduates earned declined from 4.6 credits in 1982 to 3.9 credits in 1992, remaining stable at 3.8 credits among 2004 graduates. Occupational area credits made up the bulk of CTE credits earned by each cohort, and declines over time were most apparent in these courses. Whereas 1982 graduates, on average, earned 3.0 occupational area credits, 1992 graduates earned 2.4 credits and 2004 graduates earned 2.6. Among specific occupational program areas, graduates earned fewer total credits in business; marketing; and manufacture, repair, and transportation. In computer and information science, however, the average number of credits earned increased from 0.1 to 0.4 between the 1982 cohort and the

2004 cohort. In Chapter 4, further analyses examine whether there was a relationship between these changes (i.e., whether increasing academic coursetaking was associated with declines in CTE credits earned).

Changes in the average total number of CTE credits earned can be seen in more detail in the percentage of graduates earning specific numbers of CTE and occupational credits, as seen in table 2. The percentages of graduates earning 5, 6, 7, or 8 or more CTE credits declined between 1982 and 2004, with most decreases occurring between 1982 and 1992. Similarly, the percentage of graduates earning zero CTE credits increased over time from 2 percent in 1982 to 4 percent in 2004. However, the percentages of graduates earning 1, 2, or 3 total CTE credits increased between 1982 and 1992, and remained higher in 2004: whereas 38 percent of graduates earned 1, 2, or 3 credits in CTE in 1982, 48 percent of graduates did so in both 1992 and 2004.

The results are similar for overall occupational coursetaking, as shown in table 3: the percentages of graduates earning a total of 5, 6, or 7 occupational credits decreased between 1982 and 1992 (staying lower in 2004), and the percentages earning 1 or 2 total occupational credits increased between 1982 and 2004. Thirty-five percent of graduates earned 1 or 2 occupational credits in 1982, compared with 42 percent in 2004.

These declines are also reflected in the percentage of all courses which were occupational. This measure provides a way of gauging involvement relative to overall course intensity. The percentage of graduates earning 15 percent or more of their total credits in occupational courses dropped from 40 percent in 1982 to 24 percent in 1992 and 22 percent in 2004 (table 4). The percentage of graduates earning more than zero to just less than 15 percent of their credits in occupational courses increased from 1982 to 2004 from 49 to 67 percent.

Table 2. Percentage of public high school graduates by total career and technical education (CTE) credits (Carnegie units) earned: 1982, 1992, and 2004

Number of CTE credits earned	1982	1992	2004
0	2.0	2.4	4.4
less than 1	3.7	4.6	4.3
1	12.0	15.3	14.3
2	12.8	17.3	17.6
3	13.4	15.9	16.1
4	12.9	13.4	13.4
5	11.5	10.7	9.4
6	10.2	6.6	7.0
7	8.0	5.8	4.9
8 or more	13.6	8.0	8.6

NOTE: A Carnegie unit is equivalent to a course taken for one period each day for one full school year. Credit categories are divided by the credit indicated up to (but not including) the next credit: for example, 1 credit to less than 2 credits, 2 credits to less than 3 credits, etc.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table 3. Percentage of public high school graduates by total occupational credits (Carnegie units) earned: 1982, 1992, and 2004

Number of occupational credits earned	1982	1992	2004
0	11.1	14.3	11.2
less than 1	7.3	8.6	8.1
1	18.4	24.2	22.7
2	17.2	17.6	19.6
3	14.1	13.5	14.3
4	10.0	8.3	9.3
5	7.1	5.1	5.6
6	5.9	3.7	3.8
7	4.5	2.2	2.1
8 or more	4.4	2.6	3.3

NOTE: A Carnegie unit is equivalent to a course taken for one period each day for one full school year. Credit categories are divided by the credit indicated up to (but not including) the next credit: for example, 1 credit to less than 2 credits, 2 credits to less than 3 credits, etc.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table 4. Percentage of public high school graduates by percentage of all credits (Carnegie units) earned in occupational courses: 1982, 1992, and 2004

Percent of all courses that were occupational	1982	1992	2004
0	11.1	14.3	11.2
>0 to <5	15.1	21.3	21.1
5 to <10	17.5	23.2	26.8
10 to <15	16.8	16.9	19.1
15 to <25	22.0	16.5	16.2
25 or more	17.5	7.8	5.6

NOTE: A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

- ***The percentage of graduates taking occupational courses at low levels increased over time, while occupational concentration became less common.***

At the same time that overall CTE and occupational coursetaking declined across graduating cohorts, graduates increasingly spread their occupational coursetaking across multiple areas of study. In 1982, for example, about 26 percent of graduates earned credits in 3 or more occupational areas (table 5). Although this had dipped slightly in 1992 (to 23 percent), in 2004, 33 percent of graduates had earned credits in 3 or more areas.

Table 5. Percentage of public high school graduates by number of occupational areas in which credit was received: 1982, 1992, and 2004

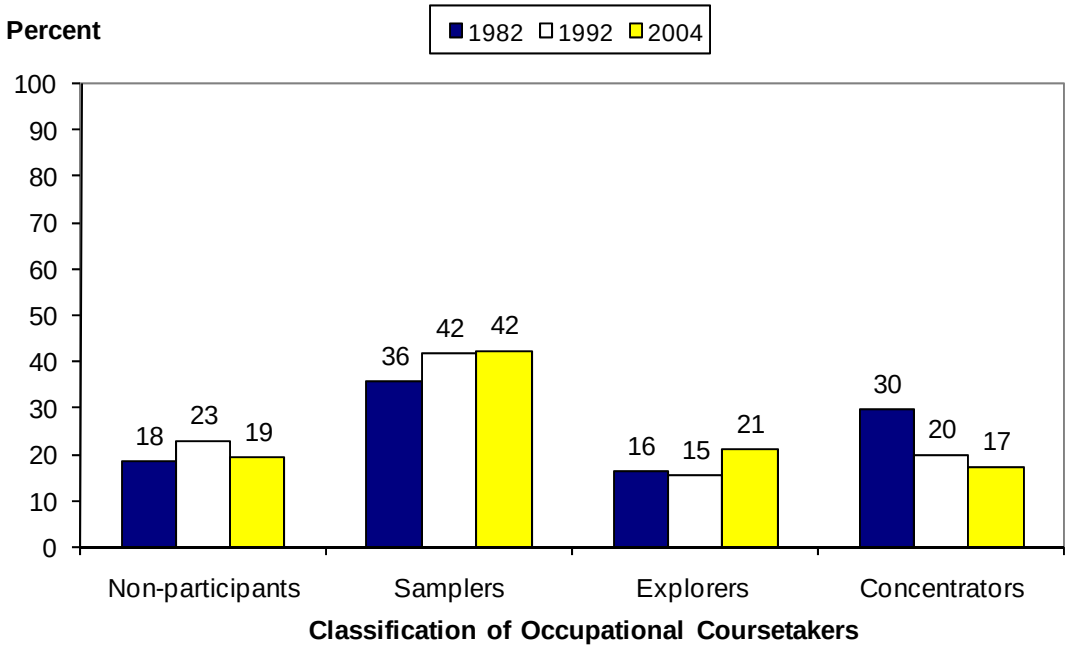
Number of occupational areas in which credit was received	1982	1992	2004
0	11.1	14.3	11.2
1	31.7	31.2	25.6
2	30.7	31.3	29.4
3	16.7	15.3	20.2
4	6.8	6.0	9.7
5	2.1	1.4	2.9
6 or more	0.8	0.5	1.0

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Occupational Investment and Academic Orientation

The increasing spread of occupational credits across areas was driven by both declining percentages of occupational concentrators (focusing their studies in one area) and increasing percentages of graduates simply taking a small and diffuse set of occupational credits. Figure 1 shows this by presenting the breakdown of occupational investment into the four categories defined in chapter 2: nonparticipants, samplers, explorers, and concentrators. Nonparticipation in occupational coursetaking (less than 1 credit earned) showed no change between 1982 and 2004, although 1992 nonparticipation was higher than in the other 2 years. However, the percent of samplers (earning 1 to fewer than 3 occupational credits) and the percentage of explorers (earning at least 3 occupational credits, but with no concentration) both increased. Samplers grew from 36 percent of graduates in 1982 to 42 percent in 1992 (remaining higher in 2004), while the jump for explorers lagged and grew from 16 percent in 1992 to 21 percent in 2004. Occupational concentration (3 or more credits in at least 1 occupational area), however, declined from 29 percent in 1982 to 20 percent in 1992, falling further to 17 percent in 2004.

Figure 1. Percentage of public high school graduates in categories of occupational coursetaking: 1982, 1992, and 2004



NOTE: Non-participants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

- ***The percentage of graduates with an academic focus grew strongly over time, comprising the majority of all graduates in 2004.***

The trends in occupational coursetaking can be compared to trends in academic coursetaking. These trends are shown in figure 2. Academically oriented students grew steadily from 1982 through 2004: academic focus graduates were 15 percent of the 1982 graduating class; in 1992, this had increased to 47 percent, and continued to increase to 60 percent in 2004.

Table 6 brings together occupational investment categories and academic orientation groups. The total values in table 6 repeat figure 1, but table 6 additionally provides breakdowns of occupational coursetaking by academic orientation group. In contrast to the totals, patterns for academic focus graduates were different than for general education graduates. Occupational nonparticipants declined over time among academic focus graduates and saw no change among general education graduates. The percent of samplers among academic focus graduates saw no change, while the percent of samplers among general education graduates increased from 34 percent in 1982 to 42 percent in 2004. The only similarity in patterns was observed among explorers, where the percent increased for both academic and general education graduates (standing above 20 percent for each group in 2004). Finally, occupational concentration among

academic focus graduates increased over time, while decreasing among general education graduates.

The overall effect of these different patterns was to make academic focus and general education graduates much more similar in 2004 than they had been in 1982 (at least with respect to occupational coursetaking). Among 1982 academic focus graduates, for example, 10 percent were occupational concentrators, while 33 percent of 1982 general education graduates were concentrators. In 2004, however, the percentages were 17 and 18 percent, respectively. Similar results are seen for each occupational coursetaking group.

Table 6. Percentage of public high school graduates in categories of occupational coursetaking, by academic orientation: 1982, 1992, and 2004

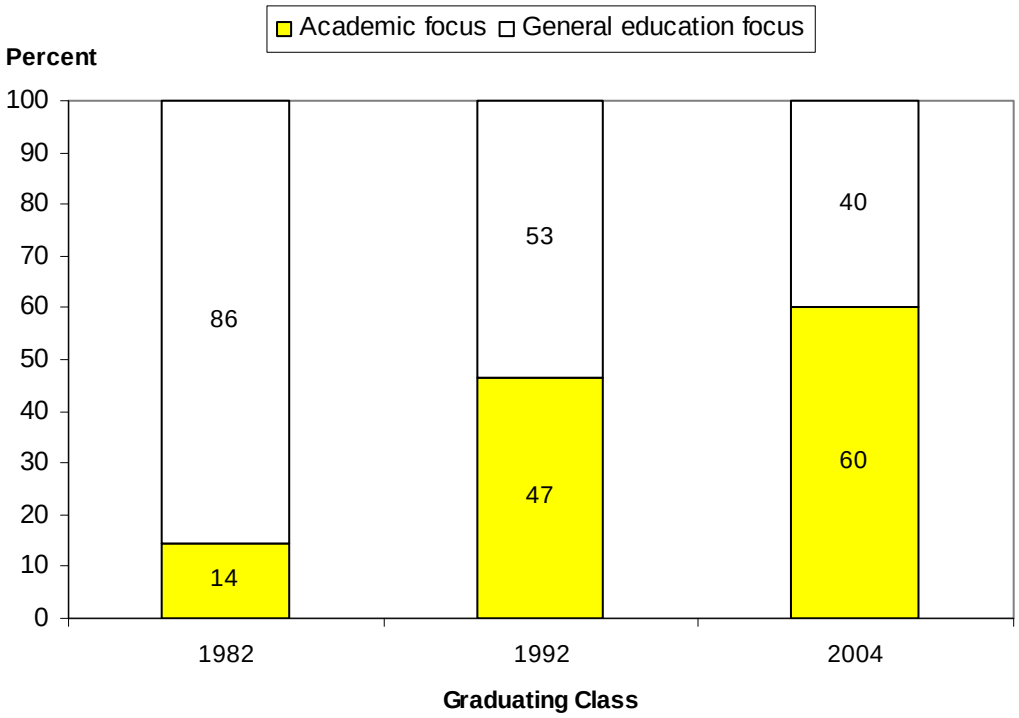
				Academic orientation					
	Total			Academic focus			General education		
Classification of occupational coursetakers	1982	1992	2004	1982	1992	2004	1982	1992	2004
Noninvestors	54.0	64.7	61.6	80.8	75.0	62.8	49.5	55.7	59.8
Nonparticipants	18.4	22.9	19.3	37.1	29.8	20.5	15.2	16.9	17.6
Samplers	35.6	41.8	42.3	43.7	45.3	42.3	34.3	38.8	42.2
Occupational investors	46.0	35.3	38.4	19.2	25.0	37.2	50.5	44.3	40.2
Explorers	16.3	15.5	21.1	9.3	12.6	20.5	17.4	18.0	22.0
Concentrators	29.7	19.8	17.3	9.9	12.4	16.7	33.1	26.3	18.2

NOTE: Noninvestors are the sum of nonparticipants and samplers. Nonparticipants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

However, it should be noted that very few academic focus graduates were in any given occupational coursetaking category in 1982. This is shown in table 7, where the percentages for each year sum to 100. Of the eight groups formed by occupational investment categories and academic orientation, two were much larger than the rest in 1982: general education samplers and general education concentrators (29 and 28 percent of 1982 graduates, respectively). By 1992, however, the emphasis on academic coursetaking had begun the decisive shift away from general education graduates: academic focus samplers and general education focus samplers now shared the largest-group crown (21 percent of 1982 graduates each). And in 2004, each of the occupational groups within academic focus graduates was larger than all but general education samplers, with the largest group—academic focus samplers—now comprising a quarter of all high school graduates.

Figure 2. Percentage of high school graduates, by academic orientation: 1982, 1992, and 2004



NOTE: Graduates with an academic focus earned at least 4 credits (Carnegie units) in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table 7. Relative percentage of public high school graduates, by academic orientation and occupational coursetaking categories: 1982, 1992, and 2004

Academic orientation and occupational coursetaking category	1982	1992	2004
Total	100.0	100.0	100.0
Academic focus			
Nonparticipants	5.4	13.9	12.3
Samplers	6.3	21.1	25.4
Explorers	1.4	5.9	12.3
Concentrators	1.4	5.8	10.0
General education			
Nonparticipants	13.0	9.0	7.1
Samplers	29.3	20.7	16.9
Explorers	14.9	9.6	8.8
Concentrators	28.3	14.1	7.3

NOTE: Nonparticipants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Graduates' Demographic and School Characteristics

Gender

- ***Changes in occupational investment by gender mirrored overall changes.***

Among both females and males, the percent of nonparticipants saw no change, the percentage of samplers and explorers increased, and the percentage of concentrators declined between 1982 and 2004 (table 8). However, the percentage of academic focus graduates who were samplers did not change between these two years for either gender, and the percentage of academic focus graduates who were concentrators did not change for females. Additionally, the percentage of general education graduates who were nonparticipants did not change for males between the first and last cohorts.

Females were consistently more likely to be nonparticipants and less likely to be explorers, in all years and in both academic and general education focus groups. Males and females were no different in their rates of sampling or concentrating in 1982, but by 2004, more females than males were samplers (45 percent to 40 percent) and more males than females were concentrators (21 percent to 14 percent).

Race/ethnicity

- ***Every racial/ethnic group saw an increase in samplers and a decrease in occupational concentration over time.***

Although the nominal changes in occupational investment within each racial/ethnic group were consistent with overall trends, only increases in sampling and decreases in concentration between 1982 and 2004 were consistently statistically significant for each group (except for Asian-American graduates, who saw no detectable change at any level of occupational investment). Changes within academic focus and general education graduates were similar across racial/ethnic groups, as well.

Few consistent detectable differences were observed across racial/ethnic groups, in any graduating class. That is, there was little evidence that levels of occupational investment systematically differed by race or ethnicity.

It is also worth noting that the proportion of the U.S. school-aged population that is White, non-Hispanic has declined over the last quarter century (Snyder, Dillow, and Hoffman 2009), and, therefore, Whites made up a decreasing share of each occupational coursetaking group except concentrators (where no statistical difference was observed) (not shown). White graduates remained the largest percentage of any occupational group and occupational/academic orientation group, in all years, typically followed by Black and Hispanic graduates.

Socioeconomic Status (SES)

- ***Trends in occupational investment varied by socioeconomic status. For low- and middle-SES graduates, occupational concentration declined and occupational sampling and exploration increased over time. However, there were no detectable changes in occupational investment among high-SES graduates.***

In contrast to trends by gender and race/ethnicity, changes in occupational investment between 1982 and 2004 differed by socioeconomic status (SES) quartile. Those in the highest SES quartile saw no observable change in occupational investment between 1982 and 2004, though among high-SES academic focus graduates, the percentage of nonparticipants declined from 39 percent to 27 percent, and the percentages of explorers and concentrators rose (from 7 to 16 percent, and 4 to 11 percent, respectively). In contrast, the percentage of concentrators declined for both the lowest and the middle two SES quartiles, and the percentages of explorers and samplers increased for both groups, between 1982 and 2004. Trends within academic focus and general education graduates were similar to overall trends for the two lowest SES groups.

Graduates from the highest SES quartile were less likely to be concentrators or explorers than their lower-SES peers, in all years (excepting explorers in 1982). While graduates from the lowest SES quartile were less likely than graduates from the middle two quartile group to be nonparticipants and samplers, and more likely to be concentrators, in 1982, there were no differences between these two SES quartile groups in 2004.

Table 8. Percentage of public high school graduates, by academic orientation, student characteristics, and occupational coursetaking category: 1982, 1992, and 2004

Classification of occupational coursetakers and student characteristic	Total			Academic orientation					
				Academic focus			General education focus		
	1982	1992	2004	1982	1992	2004	1982	1992	2004
Gender									
Male									
Nonparticipants	16.6	18.7	15.4	33.3	24.3	16.1	13.6	14.0	14.4
Samplers	33.9	41.0	39.7	44.3	46.2	39.5	32.1	36.6	40.1
Explorers	18.5	17.8	23.9	13.1	14.5	23.3	19.5	20.6	24.6
Concentrators	31.0	22.6	21.0	9.2	15.1	21.1	34.9	28.8	20.9
Female									
Nonparticipants	20.0	27.1	23.0	40.9	34.9	24.2	16.6	19.9	21.0
Samplers	37.2	42.7	44.6	43.0	44.4	44.8	36.2	41.0	44.3
Explorers	14.2	13.2	18.5	5.5	10.8	18.0	15.6	15.3	19.4
Concentrators	28.6	17.1	13.8	10.6	9.9	12.9	31.5	23.7	15.3
Race/ethnicity[1]									
Asian/Pacific Islander									
Nonparticipants	26.2	24.0	24.6	34.4	32.1	26.4	23.7	14.7	20.9
Samplers	46.0	43.3	48.7	50.4	47.5	48.8	44.6	38.5	48.5
Explorers	14.7	15.8	17.2	9.2	9.0	16.0	16.5	23.7	19.4
Concentrators	13.0	16.8	9.6	6.0	11.3	8.7	15.3	23.2	11.2
Black									
Nonparticipants	16.2	23.6	16.8	42.4	28.0	17.2	12.6	19.8	16.0
Samplers	36.9	43.6	44.8	41.9	47.0	40.5	36.2	40.5	53.2
Explorers	15.5	16.2	20.5	5.8	14.3	23.4	16.9	17.9	14.9
Concentrators	31.4	16.6	17.9	9.8	10.6	18.9	34.3	21.8	15.9
Hispanic									
Nonparticipants	14.2	16.1	20.8	28.8	19.2	20.4	13.2	14.5	21.1
Samplers	32.3	51.1	45.7	45.7	56.4	47.2	31.4	48.4	44.3
Explorers	19.7	16.8	20.7	15.1	16.4	18.6	20.0	17.0	22.6
Concentrators	33.9	16.0	12.8	10.4	8.0	13.7	35.5	20.1	12.0
White									
Nonparticipants	19.1	23.8	19.4	37.2	31.0	20.8	15.7	17.2	17.1
Samplers	35.9	40.1	40.1	43.6	43.7	40.9	34.4	36.8	38.6
Explorers	15.9	15.0	21.7	9.3	12.2	20.7	17.1	17.6	23.5
Concentrators	29.2	21.1	18.8	9.9	13.1	17.6	32.8	28.5	20.8
Other									
Nonparticipants	16.7	10.5	15.5	30.9	14.9	18.7	15.4	8.5	12.5
Samplers	30.9	47.8	47.7	34.8	59.4	48.1	30.6	42.6	47.3
Explorers	17.7	23.1	19.6	‡	6.3	18.7	17.9	30.8	20.5
Concentrators	34.7	18.6	17.2	‡	‡	14.5	36.3	‡	19.7
Socioeconomic status									
Lowest quartile									
Nonparticipants	12.0	13.1	15.9	38.4	17.3	16.2	9.5	11.3	15.6
Samplers	30.3	34.8	39.9	36.4	42.7	39.4	29.7	31.2	40.4
Explorers	17.5	21.3	23.1	14.9	17.8	23.2	17.8	22.8	22.9
Concentrators	40.2	30.8	21.1	10.3	22.2	21.2	43.0	34.7	21.0

See notes at end of table.

Table 8. Percentage of public high school graduates, by academic orientation, student characteristics, and occupational coursetaking category: 1982, 1992, and 2004—Continued

Classification of occupational coursetakers and student characteristic	Total			Academic orientation					
				Academic focus			General education focus		
	1982	1992	2004	1982	1992	2004	1982	1992	2004
Middle 2 quartiles									
Nonparticipants	16.2	19.0	17.3	35.1	25.7	18.4	13.2	13.7	15.6
Samplers	35.7	43.6	41.9	42.4	46.1	41.4	34.7	41.8	42.6
Explorers	16.5	15.6	22.5	9.4	14.1	22.1	17.6	16.7	23.1
Concentrators	31.6	21.8	18.4	13.1	14.1	18.2	34.6	27.8	18.7
Highest quartile									
Nonparticipants	29.3	36.2	26.2	39.5	38.4	26.9	26.5	32.5	24.9
Samplers	41.7	42.3	45.1	49.0	45.1	45.9	39.7	37.4	43.4
Explorers	14.4	11.7	16.7	7.3	9.2	16.0	16.3	16.1	18.2
Concentrators	14.6	9.8	11.9	4.2	7.3	11.2	17.5	14.1	13.4

‡ Reporting standards not met

[1] Asian/Pacific Islander includes Native Hawaiian. Hispanic may be of any race. "Other" category refers to those answering "other" in 1982 and 1992 and those answering more than one race in 2004.

NOTE: Non-participants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Size of School and Urbanicity

Table 9 presents two attributes of the schools from which the respondents graduated: the size of the school and the urbanicity of the school's locale. School sizes are divided into small (fewer than 1,000 students), medium (1,000 to 1,999 students), and large (more than 2,000 students) categories. Urbanicity is divided into urban, suburban, and rural.

- ***Trends in occupational investment among graduates of different school sizes or locales (urban, suburban, or rural) were the same as overall trends.***

As with the changes in the overall population, graduates from schools of different sizes increasingly were samplers and explorers and decreasingly were concentrators (table 9). Likewise, nonparticipation did not change for any group between 1982 and 2004. Changes among academic focus and general education graduates were also similar to overall trends. In both 1992 and 2004, graduates from small schools were less likely to be samplers and more likely to be concentrators than graduates from large schools. For example, 21 percent of small-school graduates were concentrators in 2004, compared to 12 percent of large-school graduates.

Occupational concentration declined for graduates of schools in all locales (urban, suburban, and rural), and exploration increased for graduates of urban and suburban schools. However, despite a jump in 1992, the percent of suburban school graduates who were samplers did not change when 1982 is compared to 2004. Additionally, the percent of rural school

graduates who were nonparticipants increased over time, from 15 percent in 1982 to 23 percent in 2004. In 2004, suburban school graduates were less likely to be samplers and more likely to be concentrators than either their urban or rural counterparts. The suburban versus urban or rural differences represent a change from 1982, when suburban school graduates were not statistically different from their peers in sampling and were less likely than rural school graduates to concentrate in an occupational field of study.

Table 9 Percentage of public high school graduates, by academic orientation, characteristics of school attended, and occupational coursetaking category: 1982, 1992, and 2004

Classification of occupational coursetakers and school characteristic	Total			Academic orientation					
				Academic focus			General education focus		
	1982	1992	2004	1982	1992	2004	1982	1992	2004
Size of 12th-grade school									
Small (less than 1,000 students)									
Nonparticipants	17.3	19.7	15.0	38.2	27.2	17.0	13.5	13.3	11.8
Samplers	31.6	37.9	37.6	40.5	43.6	38.5	30.0	33.1	36.3
Explorers	16.1	18.7	26.0	12.3	15.1	25.0	16.7	21.8	27.6
Concentrators	35.0	23.7	21.4	9.0	14.1	19.5	39.8	31.8	24.3
Medium (1,000 to 1,999 students)									
Nonparticipants	18.4	26.0	19.7	38.1	33.2	20.2	15.3	19.2	18.9
Samplers	37.8	43.3	43.5	43.4	45.0	45.1	36.9	41.7	41.1
Explorers	15.7	13.2	19.7	7.8	10.2	19.0	17.0	16.0	20.7
Concentrators	28.1	17.6	17.1	10.7	11.7	15.7	30.8	23.1	19.3
Large (more than 2,000 students)									
Nonparticipants	20.2	22.8	24.5	31.1	26.3	25.8	18.5	20.1	22.7
Samplers	36.2	48.2	46.2	49.1	50.8	42.6	34.1	46.0	50.9
Explorers	17.7	13.1	17.1	9.1	12.9	16.8	19.0	13.3	17.4
Concentrators	26.0	15.9	12.2	10.7	10.1	14.7	28.4	20.6	9.0
Urbanicity									
Urban									
Nonparticipants	19.4	24.2	18.2	40.7	26.2	19.4	16.4	22.5	16.6
Samplers	37.1	45.2	43.4	45.8	47.0	44.6	35.8	43.8	41.8
Explorers	15.0	16.4	21.9	7.6	16.2	21.5	16.1	16.5	22.4
Concentrators	28.5	14.3	16.5	5.9	10.6	14.5	31.7	17.3	19.1
Suburban									
Nonparticipants	20.0	26.4	17.7	37.3	34.4	19.0	16.7	18.9	15.1
Samplers	36.5	43.9	35.4	41.8	44.7	35.1	35.4	43.2	36.0
Explorers	16.3	12.6	26.0	9.2	10.7	25.1	17.7	14.3	28.0
Concentrators	27.3	17.2	20.8	11.7	10.2	20.8	30.2	23.6	20.8
Rural									
Nonparticipants	15.5	17.5	22.5	34.9	25.7	23.5	12.5	10.6	21.1
Samplers	33.6	36.7	45.2	45.8	45.0	44.3	31.7	29.8	46.6
Explorers	16.9	18.7	15.9	10.5	12.7	14.8	17.9	23.7	17.6
Concentrators	34.0	27.1	16.3	8.8	16.6	17.4	37.9	35.9	14.7

NOTE: Non-investors earned less than 3 total occupational credits (Carnegie units). Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

4. ACADEMIC AND OCCUPATIONAL COURSETAKING

Chapter 3 presented information on the overall number of academic credits and career and technical education credits (both occupation-specific and otherwise) earned by high school graduates over time, and the proportion and types of students in each occupational coursetaking and academic orientation group. In this chapter, academic and CTE coursetaking is examined for graduates in each of the occupational coursetaking categories and across academic orientation groups.

For the past three decades, concerns about graduates leaving high school unprepared for the world of postsecondary schooling or work have helped fuel increases in high school graduation requirements. For example, the number of states requiring 2.5 or more credits in mathematics to graduate increased from about 12 in 1987 to 28 in 2006; a similar increase was observed in science, with a smaller increase in social studies requirements (in contrast, English requirements among states have remained relatively steady in the past 30 years; Toye et al. 2006). As would be expected, these increases have been paralleled by documented increases in students' academic coursetaking over time (Dalton et al. 2007; Shettle et al. 2007).

From the perspective of CTE and occupation-specific learning, one question is whether these increased requirements have made occupational investors (explorers and concentrators) more like noninvestors in the number of academic credits earned. Have occupational investors moved toward taking just the minimum academic requirements, or have they more fully committed to academic programs of study in high school? Prior evidence has indicated that CTE students increased their academic coursetaking at greater rates than non-CTE students did (Levesque et al. 2000); does this remain true for the class of 2004, as well? In addition to accumulating credits, how has the level of coursetaking (the highest subject attained, for example) among occupational investors and noninvestors changed over time? The level of advancement is particularly important for subject areas such as mathematics and science, where the clear delineation of subjects in a relatively ordered sequence can reveal the degree of preparation for postsecondary education or employment and training in quantitative and analytical reasoning (Burkam and Lee 2003). Finally, what is the general relationship between occupational and academic coursetaking? Do students substitute one for the other (i.e., do occupational concentrators avoid academic coursetaking in their pursuit of occupational specialization, or do academic subject requirements prevent occupational coursetaking)?

Academic Credits Earned

Table 10 presents the average number of credits earned in specific academic subjects for occupational investors and noninvestors.

Table 10. Average number of credits (Carnegie units) earned in academic subjects by public high school graduates, by academic orientation and occupational coursetaking category: 1982, 1992, and 2004

Academic subject and occupational coursetaking category	Total			Academic orientation					
				Academic focus			General education		
	1982	1992	2004	1982	1992	2004	1982	1992	2004
English									
Nonparticipants	4.2	4.3	4.4	4.5	4.5	4.6	4.1	4.1	4.0
Samplers	4.0	4.3	4.3	4.3	4.4	4.6	4.0	4.1	3.9
Explorers	3.8	4.2	4.3	4.3	4.3	4.5	3.7	4.1	3.9
Concentrators	3.8	4.1	4.2	5.0	4.3	4.5	3.8	4.0	3.8
Mathematics									
Nonparticipants	3.2	3.5	3.7	3.8	3.8	4.0	3.0	3.0	3.2
Samplers	2.9	3.4	3.7	3.8	3.7	4.0	2.7	3.0	3.1
Explorers	2.5	3.1	3.6	3.6	3.6	4.0	2.4	2.8	3.0
Concentrators	2.2	2.9	3.5	4.3	3.6	3.8	2.1	2.7	3.0
Science									
Nonparticipants	2.9	3.4	3.5	3.8	3.8	3.9	2.6	2.7	2.9
Samplers	2.5	3.1	3.4	3.7	3.7	3.8	2.2	2.5	2.8
Explorers	2.0	2.8	3.2	3.6	3.5	3.7	1.9	2.4	2.6
Concentrators	1.8	2.5	3.1	3.9	3.5	3.6	1.6	2.2	2.5
Social studies									
Nonparticipants	3.4	3.8	3.9	3.9	3.9	4.1	3.1	3.6	3.6
Samplers	3.2	3.5	3.9	3.7	3.7	4.1	3.1	3.3	3.6
Explorers	3.1	3.4	3.9	3.7	3.7	4.1	3.0	3.3	3.6
Concentrators	3.0	3.3	3.6	4.2	3.5	3.8	3.0	3.2	3.4
Fine arts									
Nonparticipants	2.2	2.5	2.8	1.6	2.0	2.9	2.4	3.1	2.7
Samplers	1.6	1.8	2.2	1.2	1.6	2.2	1.7	1.9	2.2
Explorers	1.3	1.3	1.6	1.0	1.1	1.6	1.4	1.4	1.7
Concentrators	1.0	0.9	1.4	0.6	0.8	1.3	1.0	1.0	1.5
Non-English Language									
Nonparticipants	1.9	2.5	2.5	2.3	2.8	2.7	1.7	2.0	2.0
Samplers	1.2	1.9	2.1	1.8	2.3	2.4	1.1	1.6	1.7
Explorers	0.7	1.4	1.7	1.1	1.9	2.0	0.6	1.1	1.3
Concentrators	0.5	0.9	1.4	0.6	1.5	1.6	0.4	0.6	1.1

NOTE: Noninvestors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

- ***In all occupational coursetaking groups, the average number of credits earned in each academic subject increased between 1982 and 2004.***

Occupational investors and noninvestors earned more credits in English, math, science, social studies, fine arts, and non-English (foreign) language over time. The changes for occupational explorers and concentrators were especially large. For example, while occupational nonparticipants were earning around 3 credits each in math and science in 1982, occupational concentrators were earning around 2 at that time; in 2004, however, both groups were earning above 3 credits in these two subjects. Across academic orientation groups, only academic focus graduates who were occupational samplers consistently showed growth over time. However, general education graduates in every occupational coursetaking category increased their coursetaking in every subject except English (and fine arts for occupational nonparticipants).

- ***In every academic subject, across all years, occupational concentrators earned fewer credits than graduates who did not participate in occupational coursetaking or who only sampled occupational courses.***

In addition, in mathematics and science, occupational explorers earned fewer credits than nonparticipants in all years. The average differences in credits were generally small, however: for example, occupational concentrators earned an average of 4.2 credits in English in 2004, compared with 4.4 credits for nonparticipants. Nor did the overall difference hold in every academic subject for either academic focus or general education focus graduates (only in fine arts and non-English [foreign] language did occupational concentrators earn fewer credits than nonparticipants and samplers in both academic and general education groups).

Highest Mathematics and Science Courses Taken

Tables 11 and 12 show the percentage of graduates whose highest math and science course (respectively) were at various levels. For mathematics, courses were divided into five levels: no math credits or low-academic math only; algebra I or plane geometry; algebra II; algebra III, trigonometry, or analytic geometry; and precalculus or calculus. If a graduate earned at least one credit at a given level, in any grade, he or she was counted in that level.

For science, courses were divided into four levels: no science credits or low-level science only; secondary physical science (e.g., earth science) or basic biology; general biology; or advanced biology, chemistry, or physics. Again, if a graduate earned at least one credit at a given level, in any grade, he or she was counted in that level.

- ***Graduates in each occupational coursetaking group reached only algebra I or lower courses less frequently, and precalculus/calculus more frequently, over time.***

For example, while 39 percent of 1982 occupational concentrators only attained no or low-level academic math courses, only 9 percent did so in 2004 (table 11). Both occupational explorers and concentrators increased coursetaking at the levels of algebra II, algebra III, and precalculus/calculus. The same general pattern held for both academic focus and general education graduates.

Table 11. Percentage of public high school graduates completing given highest level of mathematics, by academic orientation and occupational concentration category: 1982, 1992, and 2004

Highest level of math completed and occupational coursetaking category	Total			Academic orientation					
				Academic focus			General education		
	1982	1992	2004	1982	1992	2004	1982	1992	2004
Nonparticipants									
No math or low academic math	12.3	8.0	4.3	2.8	1.2	1.1	16.2	18.3	9.9
Algebra I/plane geometry	21.5	11.9	15.0	8.3	6.4	9.6	27.0	20.5	24.5
Algebra II	21.6	28.0	21.0	27.5	26.8	20.2	19.2	29.8	22.3
Algebra III/trigonometry/analytic geometry	24.4	20.6	19.2	33.5	25.3	21.3	20.6	13.4	15.4
Precalculus/calculus	20.2	31.5	40.5	27.9	40.3	47.8	17.0	18.0	27.8
Samplers									
No math or low academic math	20.5	7.9	4.3	4.6	1.7	2.1	24.0	14.3	7.6
Algebra I/plane geometry	28.3	23.2	17.9	9.5	11.2	9.8	32.4	35.5	30.1
Algebra II	19.5	29.3	26.1	22.0	30.4	26.2	19.0	28.2	25.9
Algebra III/trigonometry/analytic geometry	18.7	15.9	17.9	35.5	20.5	19.7	15.1	11.3	15.2
Precalculus/calculus	12.9	23.6	33.9	28.4	36.2	42.3	9.6	10.7	21.2
Explorers									
No math or low academic math	28.2	12.7	5.8	10.4	3.1	3.2	29.8	18.6	9.5
Algebra I/plane geometry	35.3	27.5	22.4	16.7	8.0	11.5	37.0	39.4	37.6
Algebra II	17.9	29.6	29.4	28.7	33.1	31.2	16.9	27.5	26.9
Algebra III/trigonometry/analytic geometry	12.9	16.2	17.0	34.6	30.6	20.6	11.0	7.4	12.0
Precalculus/calculus	5.6	14.0	25.3	9.6	25.2	33.4	5.2	7.2	14.0
Concentrators									
No math or low academic math	38.5	24.1	9.4	12.7	6.7	6.3	39.8	31.2	13.7
Algebra I/plane geometry	38.2	31.6	24.7	28.2	17.2	16.8	38.7	37.5	35.7
Algebra II	14.3	24.7	30.7	21.7	31.0	32.9	13.9	22.1	27.7
Algebra III/trigonometry/analytic geometry	7.0	12.0	14.5	32.2	27.0	17.7	5.7	5.9	10.1
Precalculus/calculus	2.0	7.6	20.6	5.2	18.1	26.3	1.9	3.4	12.8

NOTE: Noninvestors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

- ***Occupational explorers and concentrators reached the highest level of math (precalculus or calculus) at lower rates than samplers and nonparticipants in all years.***

For example, 21 percent of occupational concentrators and 25 percent of explorers attained precalculus/calculus in 2004, compared to 34 percent of samplers and 41 percent of nonparticipants. Occupational concentrators also reached only the algebra I level or below more often than samplers and nonparticipants, in all years. The same patterns in reaching

precalculus/calculus held for both academic focus and general education groups, in all years (except for samplers versus explorers in 1992).

- ***For all occupational coursetaking groups, science coursetaking at higher levels increased, and at lower levels decreased, over time.***

For example, chemistry, physics, and advanced biology (the highest science level) was taken by 16 percent of occupational concentrators in 1982; in 2004, 56 percent of occupational concentrators took courses at this level (table 12). The only exception to the consistent shift toward higher-level science courses was among nonparticipants taking no or low-level science courses. However, this overall shift was primarily driven by general education students; none of the differences between 1982 and 2004 were statistically significant for academic focus graduates.

- ***In all years, occupational concentrators and explorers reached the highest level of science (advanced biology, chemistry, or physics) at lower rates than nonparticipants or samplers.***

In 2004, 77 percent of nonparticipants, 71 percent of samplers, 63 percent of explorers, and 56 percent of concentrators completed the highest science level. The same was true for both academic focus and general education focus graduates.

College Preparation and Occupational Coursetaking

Another way of examining the coursetaking experiences of occupational investors and noninvestors is to determine whether their cumulative coursetaking helps prepare them for college. College preparation can be defined in multiple ways, including using measures beyond coursetaking, but here we examine the coursetaking profiles of graduates with respect to a set of admissions standards for 4-year colleges. These standards were developed on the basis of research into 4-year college admissions policies (Levesque et al. 2000). A graduate is deemed "college prepared" if he or she earned at least four credits in English; three credits in math at the level of algebra I or higher; two credits in biology, chemistry, and/or physics; two credits in social studies with at least one of those credits in U.S. or world history; and two credits in a non-English (foreign) language. Compared with the definition of academic orientation used throughout the tables and figures in this report (see chapter 2), this definition of college preparedness is somewhat more rigorous—graduates must have foreign language credits and must have credits in specific math, science, and social studies courses. However, the credit requirements are also fewer for math, science, and social studies subject areas, so some graduates defined as prepared for a 4-year college may not be defined as having an academic focus orientation. Despite this nonexclusivity, the 4-year college preparation definition represents a specific orientation for college that is useful to examine. Figure 3 presents the results.

Table 12. Percentage of public high school graduates completing given highest level of science, by academic orientation and occupational concentration category: 1982, 1992, and 2004

Highest level of science completed and occupational coursetaking category	Total			Academic orientation					
				Academic focus			General education		
	1982	1992	2004	1982	1992	2004	1982	1992	2004
Nonparticipants									
No science or low level science	4.1	1.8	2.9	‡	#	0.8	5.7	4.6	6.5
Secondary physical science, basic biology	11.2	3.8	2.6	3.2	0.5	1.5	14.5	8.9	4.5
General biology	24.1	22.3	18.1	9.8	13.3	13.6	30.0	36.2	25.9
Advanced biology, chemistry, or physics	60.6	72.1	76.5	86.9	86.2	84.1	49.8	50.3	63.1
Samplers									
No science or low level science	10.3	1.6	2.0	#	#	0.3	12.5	3.3	4.7
Secondary physical science, basic biology	14.3	6.3	3.1	3.5	2.1	1.7	16.7	10.5	5.3
General biology	33.7	34.1	24.2	16.8	22.3	16.9	37.3	46.2	35.3
Advanced biology, chemistry, or physics	41.7	58.0	70.6	79.7	75.6	81.1	33.5	40.0	54.8
Explorers									
No science or low level science	17.7	3.1	2.2	#	#	‡	19.3	4.9	5.0
Secondary physical science, basic biology	14.7	9.8	3.6	4.7	1.5	2.2	15.6	14.9	5.6
General biology	40.8	39.4	31.2	23.6	20.9	21.9	42.3	50.7	44.1
Advanced biology, chemistry, or physics	26.8	47.7	63.0	71.7	77.7	75.7	22.7	29.5	45.3
Concentrators									
No science or low level science	25.7	4.9	5.0	3.7	‡	1.6	26.8	6.9	9.6
Secondary physical science, basic biology	18.6	10.6	5.8	13.1	2.1	3.7	18.9	14.0	8.7
General biology	39.9	53.1	33.6	27.7	28.5	30.0	40.5	63.2	38.6
Advanced biology, chemistry, or physics	15.9	31.5	55.6	55.5	69.2	64.6	13.9	15.9	43.1

Rounds to zero

‡ Reporting standards not met

NOTE: Noninvestors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

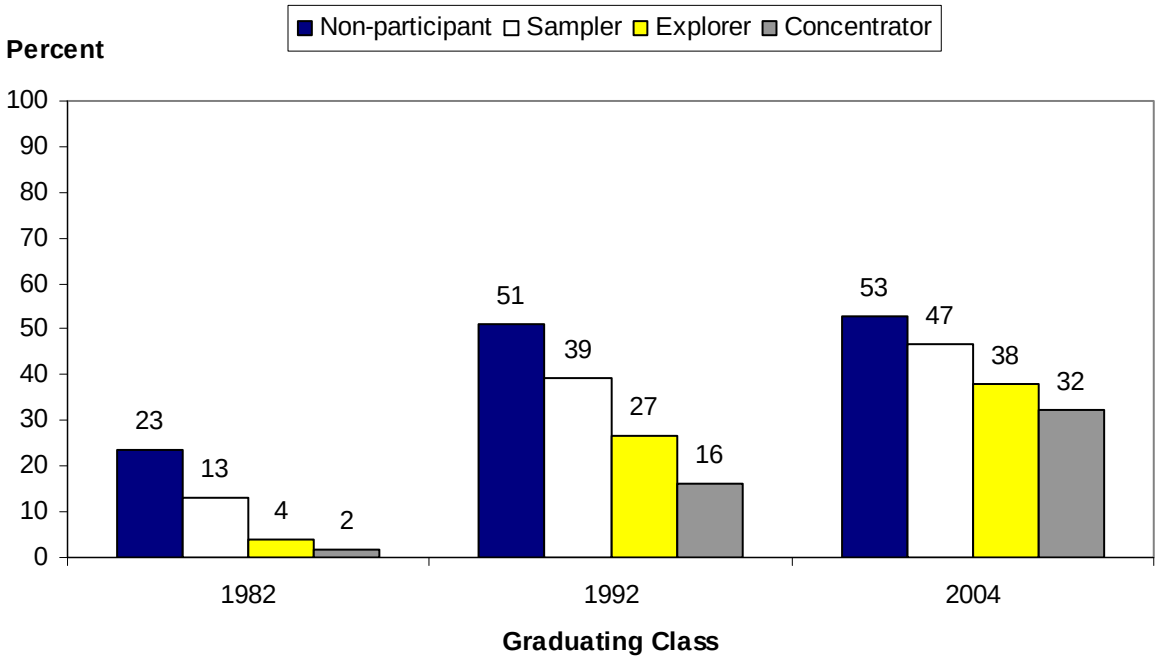
SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

- ***Between 1982 and 2004, college preparation increased for graduates in all occupational coursetaking groups.***

For occupational concentrators, for example, the college preparation rate increased from 2 percent in 1982 to 16 percent in 1992 and 32 percent in 2004. However, graduates with more

involvement in occupational coursetaking were less prepared than their less-involved peers: in 2004, around half of both occupational nonparticipants and samplers were college prepared, compared with 38 percent of explorers and 32 percent of concentrators.

Figure 3. Percentage of public high school graduates completing four-year college preparatory requirements, by occupational coursetaking category: 1982, 1992, and 2004



NOTE: The criteria for four-year college preparation are at least: four credits in English; three credits in mathematics at the level of algebra I or higher; two credits in biology and/or chemistry; two credits in social studies with at least one in world or U.S. history; and two credits in one non-English (foreign) language. Non-investors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Common CTE and Occupation-specific Courses

Beyond knowing how many credits students accumulated over time and what levels of academic courses they completed, it is useful to know which specific CTE courses have been taken by graduates. Tables 13 and 14 therefore present the most common CTE and occupation-specific courses taken by graduates of any occupational coursetaking category and academic orientation. The three most common courses are presented for four categories of CTE courses—all CTE, family/consumer sciences education, general labor market preparation, and occupation-specific courses—and for each of the 11 occupation-specific areas in which occupational concentration could be achieved. The percentages represent the percentage of graduates having received credit in each course.[8] Table 13 shows the main CTE course categories, and table 14 shows the occupation-specific categories.

[8] Because of the small percentage of graduates taking any one course, many of the percentage differences implied in tables 13 and 14 are not statistically significant. In addition, courses beyond the nominal top three may be statistically indistinguishable in popularity from the top three itself. Caution is urged in interpreting these tables.

Table 13. Course titles and percentage of public high school graduates earning at least one quarter credit (Carnegie unit) in the three most commonly completed career and technical education (CTE) courses: 1982, 1992, and 2004

Area	1982	%	1992	%	2004	%
All CTE courses						
Course	Typewriting 1	54.1	Typewriting 1	38.6	Keyboarding	25.0
Course	Accounting 1	16.1	Computer Appreciation	28.6	Foods 1	14.2
Course	Business Introduction	14.7	Accounting 1	16.8	Desktop Computer Application Suites	13.4
Family and consumer sciences education						
Course	Home Economics 1	14.5	Foods 1	12.2	Foods 1	14.2
Course	Foods 1	12.7	Home Economics 1	10.5	Adult Roles and Functions	7.5
Course	Family Relations	10.5	Family Relations	10.0	Home Economics 1	5.9
General labor market preparation						
Course	Typewriting 1	54.1	Typewriting 1	38.6	Keyboarding	25.0
Course	Typewriting, Personal	11.6	Computer Appreciation	28.6	Desktop Computer Application Suites	13.4
Course	Industrial Arts 1	10.7	Keyboarding	16.6	Career Exploration	8.7
Occupational areas						
Course	Accounting 1	16.1	Accounting 1	16.8	Computer Applications	11.0
Course	Business Introduction	14.7	Drafting 1	9.8	Business Computer Programming 1	9.4
Course	Typewriting 2	14.5	Business Introduction	9.1	Accounting 1	8.2

NOTE: A Carnegie unit is equivalent to a course taken for one period each day for one full school year. Course titles may not reflect the full course title as listed in the Classification of Secondary School Courses (CSSC).

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

- ***Among all CTE courses, keyboarding (also called typewriting in earlier cohorts) was the most common course taken by graduates, although the percentage of graduates taking keyboarding declined from 54 percent in 1982 to 25 percent in 2004.***

Beginning accounting ("accounting 1") was in the top three of all CTE courses in both 1982 and 1992 (16 and 17 percent of all graduates having taken it in those cohorts, respectively), but was no longer represented in the top three in 2004 (table 13). Two computer courses were in the top three in 1992 and 2004: 29 percent of 1992 graduates had taken computer appreciation, and 13 percent of 2004 graduates had taken desktop computer application suites. Perhaps surprisingly, a basic food course ("food 1," i.e. food preparation) was the second-most common CTE course among 2004 graduates, at 14 percent.

The food preparation course was consistently in the top three of the family and consumer sciences education (FCSE) area, with between 12 and 14 percent of graduates taking this course, depending on the graduating class. Home economics was another perennial top-three FCSE course, although its popularity declined across cohorts. A family relations course and adult roles and functions course also appeared among the top three FCSE courses at various times.

Because keyboarding is classified as a general labor market preparation (GLMP) course, it was consistently the most common GLMP course. Indeed, two varieties of keyboarding or typewriting were represented in the top three of 1982 and 2004 graduates' transcripts. The two previously mentioned computer courses, also classified as GLMP courses, are in the top three in 1992 and 2004. An industrial arts course in 1982 and a general career education course in 2004 round out the most common GLMP courses.

- ***The most common occupation-specific course in 1982 and 1992 was accounting 1, with 16 and 17 percent of graduates having earned credit in it, respectively (table 8). Among 2004 graduates, the top course was computer applications; 11 percent had taken this course.***

Accounting 1 remained in the top three of the occupational area courses in 2004, with 8 percent of graduates earning credit in it. Business computer programming 1 was taken by 9 percent of 2004 graduates (table 13). Business introduction was the second-most common course taken in 1982 and the third-most common in 1992, although it was no longer in the top three in 2004. A second-level typewriting course in 1982 and drafting 1 in 1992 were the other most common occupational area courses among those graduating classes.

Table 14 shows the most common courses in each of the 11 specific occupational areas. In six of these areas, one course was consistently the most popular among graduates:

- Agriculture and natural resources: Agriculture fundamentals;
- Consumer and culinary sciences: Child development 1;
- Engineering technologies: Drafting 1;
- Health sciences: Health occupations 1;
- Manufacturing, repair, and transportation: Woodworking 1; and
- Marketing: Distributive education 1 (i.e., general marketing/merchandising).

Table 14. Course titles and percentage of public high school graduates earning at least one quarter credit (Carnegie unit) in the three most commonly completed occupational area courses: 1982, 1992, and 2004

Area	1982	%	1992	%	2004	%
Agriculture and natural resources						
Course	Agricultural Occupations 1	2.5	Agricultural Fundamentals	2.4	Agricultural Fundamentals	3.3
Course	Agricultural Fundamentals	1.6	Agricultural Occupations 1	1.8	Animal Sciences 1	1.7
Course	Horticulture	1.3	Horticulture	1.4	Horticulture	1.6
Architecture, construction, and science technology						
Course	Electricity 1	2.5	Architectural Drawing 1	1.9	Building Construction 1	2.5
Course	Architectural Drawing 1	2.4	Building Construction 1	1.8	Architectural Drawing 1	1.2
Course	Building Construction 1	1.9	Electricity 1	1.3	Carpentry 1	1.0
Business						
Course	Accounting 1	16.1	Accounting 1	16.8	Business Computer Programming 1	9.4
Course	Business Introduction	14.7	Business Introduction	9.1	Accounting 1	8.2
Course	Typewriting 2	14.5	Word Processing 1	7.7	Business Introduction	7.7
Communications and design						
Course	Graphic Arts 1	4.8	Yearbook Production 1	5.0	Yearbook Production 1	4.5
Course	Channels of Communication	3.7	Graphic Arts 1	4.9	Desktop Publishing	3.3
Course	Yearbook Production 1	2.7	Housing and Interior Design 1	2.3	Computer Graphics Design	3.1
Computer and information science						
Course	Computer Programming 1	4.0	Computer Problem Solving	5.0	Computer Applications	11.0
Course	Data Processing	3.4	BASIC, Introduction	4.9	Web Site Design, Development	4.3
Course	Computer Problem Solving	3.1	Data Processing, Introduction	4.5	Computer Programming 1	2.3
Consumer and culinary services						
Course	Child Development 1	6.3	Child Development 1	6.8	Child Development 1	6.4
Course	Child Care Services	1.5	Child Care Services	1.7	Nutrition	4.1
Course	Food Service Training 1	1.3	Nutrition	1.7	Food Service Training 1	3.7

See notes at end of table.

Table 14. Course titles and percentage of public high school graduates earning at least one quarter credit (Carnegie unit) in the three most commonly completed occupational area courses: 1982, 1992, and 2004—Continued

Area	1982	%	1992	%	2004	%
Engineering technologies						
Course	Drafting 1	10.1	Drafting 1	9.8	Drafting 1	4.8
Course	Drafting 2	2.8	Drafting 2	2.3	Computer-Assisted Design/Drafting	4.6
Course	Machine Drawing	0.8	Machine Drawing	1.3	Drafting 2	1.0
Health sciences						
Course	Health Occupations 1	1.2	Health Occupations 1	1.0	Health Occupations 1	3.6
Course	First Aid	0.7	First Aid	0.9	First Aid	2.1
Course	Chemical Technology 1	0.6	Sports Medicine	0.5	Sports Medicine	1.7
Manufacturing, repair, and transportation						
Course	Woodworking 1	11.5	Woodworking 1	6.7	Woodworking 1	5.2
Course	Clothing Construction	6.6	Clothing Construction	4.5	Auto Mechanics 1	3.7
Course	Metal Trades	5.9	Auto Mechanics 1	3.8	Welding 1	2.0
Marketing						
Course	Distributive Education 1	5.2	Distributive Education 1	4.7	Distributive Education 1	5.2
Course	Distributive Education 1, Cooperative	2.0	Distributive Education 1, Cooperative	1.6	Distributive Education 1, Cooperative	2.1
Course	Distributive Education 2	1.2	Distributive Education 2	1.0	Distributive Education 2	1.0
Public Services						
Course	Teacher Aide/Elementary	1.7	Community Services, Other	1.2	Law Enforcement	1.8
Course	Library Assistant	1.5	Library Assistant; Library Aide	1.0	Law Science	1.6
Course	Library Science	1.3	Library Science; Library Skills	0.6	Teacher Aide/Elementary	1.2

NOTE: A Carnegie unit is equivalent to a course taken for one period each day for one full school year. Course titles may not reflect the full course title as listed in the Classification of Secondary School Courses (CSSC).

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

In two other areas, one course was the most common in two of the three graduating classes. In business, accounting 1 was the most popular in 1982 and 1992. In communications and design, yearbook production 1 was the most common course in 1992 and 2004. The remaining areas had varying courses in the top spot, although often a specific course is represented in multiple years. Note that in the computer and information science area, the changing nature of the technology and approaches to instruction may have meant that some of the most common courses in this area shared substantial content similarities despite differing titles.

Tradeoffs Between Academic and CTE/Occupational Courses

In addition to academic courses and occupational courses considered independently, there may a relationship between the coursetaking behaviors of graduates who take both types of courses. Because student time is limited, some occupational coursetaking may substitute for academic courses, especially among those who intend to concentrate in an occupational area, and some academic coursetaking may take away from opportunities to take occupational area courses. To examine this possibility, this section presents results from bivariate regressions (using ordinary least squares [OLS] regression—see appendix A for details) of academic credits earned on all CTE credits earned and occupational area credits earned.

In a bivariate regression, the statistical relationship between academic and occupational courses is measured by a regression coefficient.[9] The regression coefficient indicates the direction and strength of the relationship between academic and CTE coursetaking or occupational coursetaking. In the regression models presented here, a positive coefficient indicates that each additional credit earned in an academic course is, on average, associated with an increase in occupational credits earned. The size of that increase is indicated by the size of the coefficient itself. The opposite is true as well: if the coefficient is negative, that indicates that for each additional credit earned in an academic course, on average, occupational credits earned declines by the size of the coefficient. If the coefficient were equal to 1, that would mean that each increase of 1 academic credit, on average, corresponds to an increase or decrease of exactly 1 occupational credit. A –1 (negative 1) coefficient would represent a perfect substitution or tradeoff effect.[10]

Results from 10 total models are presented: five in table 15, and five in table 16. Table 15 shows the effect of academic credits earned on total CTE credits earned; table 16 shows the effect of academic credits earned on total occupational area credits earned. In both tables, five models are presented: four with a single academic credit predictor (total academic credits, total math credits, highest math credit earned, and total science credits), and one with both total math

[9] An intercept is also estimated. The intercept, or constant, indicates the expected value on the outcome variable (here, CTE credits or occupational credits) when the independent variable (here, academic credits) is zero. Because the intercept value has no meaning in the current context (by definition, none of the sample members in the current study can have zero academic credits), only the regression coefficients are discussed.

[10] In the models presented, no factors other than academic credits are included as predictor variables. Other student characteristics may account for relationships observed between academic and occupational coursetaking. However, the purpose of the current analysis is to explore the main relationship, not explain it; the bivariate regression results provide a useful summary of the unadjusted relationship between the two types of coursetaking.

and total science credits earned in the model simultaneously. The last model helps to determine whether both math and science credits are associated with CTE or occupational courses earned, even after accounting for the effects of the other.

Table 15. Coefficients from ordinary least squares regression of total career and technical education (CTE) credits on academic credits earned: 1982, 1992, and 2004

Independent variable(s)	1982		1992		2004	
Single-variable models						
Total academic credits	-0.44	***	-0.43	***	-0.31	***
Total math credits	-0.96	***	-0.97	***	-0.41	***
Highest math credit is algebra II or greater	-0.95	***	-0.87	***	-0.69	***
Total science credits	-0.96	***	-0.80	***	-0.52	***
Two-variable model						
Total math credits	-0.58	***	-0.63	***	-0.21	***
Total science credits	-0.67	***	-0.55	***	-0.45	***

*Statistically significant at p<.05

**Statistically significant at p<.01

***Statistically significant at p<.001

NOTE: Credits refer to Carnegie units. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table 16. Coefficients from ordinary least squares regression of total occupational area credits on academic credits earned: 1982, 1992, and 2004

Independent variable(s)	1982		1992		2004	
Single-variable models						
Total academic credits	-0.33	***	-0.31	***	-0.21	***
Total math credits	-0.67	***	-0.66	***	-0.24	***
Highest math credit is algebra II or greater	-0.64	***	-0.56	***	-0.40	***
Total science credits	-0.71	***	-0.54	***	-0.31	***
Two-variable model						
Total math credits	-0.38	**	-0.43	**	-0.13	**
Total science credits	-0.53	***	-0.37	***	-0.26	***

*Statistically significant at p<.05

**Statistically significant at p<.01

***Statistically significant at p<.001

NOTE: Credits refer to Carnegie units. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

The findings are consistent across table 15 (total CTE credits) and table 16 (total occupational area credits):

- ***An increase in academic credits earned is associated with a decrease in CTE or occupational credits earned.***

In other words, all coefficients are negative, and all are statistically significant. The smallest effect is a coefficient of -0.13 in table 16 (in the combined math and science credits model of total occupational area credits in 2004). This coefficient indicates that each additional math credit earned reduces the average occupational area credit earned by about 1/8th of a credit. The largest effect is a coefficient of -0.97 in table 15 (the math credits model of total CTE credits in 1992). Similarly large effects can be observed in models of total CTE credits in 1982 (table 15). Each of these larger effects indicate that, in 1982 and to a lesser degree in 1992, an additional math or science credit increase was associated with taking 1 fewer CTE credit—a near-perfect relationship. In the combined model of math and science credits in table 15, the effects for math and science credits each are above half a CTE credit, suggesting that they have a cumulative and independent influence on total CTE credit coursetaking.

- ***Academic-CTE or academic-occupational course tradeoffs were weaker in 2004 compared with earlier years.***

For example, the effect of an additional science course on occupation-specific coursetaking in 2004 (-0.31) was less than half of what it was in 1982 (-0.71) (table 16). Although the effects remain negative in 2004, the tradeoffs between academic and CTE or occupational coursetaking are much diminished. This result is in line with earlier descriptive information (chapter 3) showing that many more occupational investors also had an academic focus in 2004 compared with prior graduating classes.

Overall, academic coursetaking is associated with diminished occupational coursetaking. It is important to note that this can be stated the opposite way, with a different implication: that occupational coursetaking is associated with diminished academic coursetaking. Although the statistical language of the models implies one causal direction, the results could support the conclusion that either (1) students make decisions about increasing or decreasing academic coursetaking, and therefore limit or expand the amount of time they have to enroll and earn credit in CTE or occupational area courses; or (2) students make the decision to pursue or avoid CTE or occupational area courses and therefore drop or make room for academic courses. Indeed, students may be making these choices simultaneously across a variety of subjects and courses, and the choice process may not be unidirectional but rather reciprocal (i.e., involving a continual evaluation of the balance of courses in their schedules).

Regardless, the results from the regression results indicate that academic and CTE courses are not earned independently of one another, which is not surprising considering the historical distinction between academic and vocational tracks and the inherent limitations on students' time. Further research may shed light on whether the academic-CTE coursetaking tradeoffs are similar in magnitude to other tradeoffs that students may make across academic subjects or across academic, CTE, and enrichment/other courses simultaneously.

5. MATH ACHIEVEMENT

A central focus of state and federal education reforms in the past decade has been the establishment of accountability systems (i.e., the use of student assessments to hold schools and sometimes teachers accountable for progress in educational achievement). From an emphasis on coursetaking requirements originating from the 1983 *A Nation at Risk* report (whose calls for increased graduation standards were successful, as seen in chapters 3 and 4), standardized tests have taken center stage as the measure of educational success. This coincides with the shift toward concern about the academic performance of career and technical education students, particularly in light of global economic competition and the increasing value of technical and analytical skills in the labor market. To what extent is the academic performance of occupational investors on par with that of noninvestors? How has the academic achievement of occupational investors changed over time, both independently and relative to noninvestors' achievement?

This chapter examines mathematics achievement and its relationship to occupational coursetaking in the graduating classes of 1992 and 2004. While mathematics knowledge and skills were also assessed in 1982, only the 1992 and 2004 math test results have been placed on the same scale. An overall mathematics score is examined for each cohort (results for proficiency levels representing specific levels of mastery are presented in appendix A). The overall math score is measured as a number-right score. Because students did not take every item in the math test item pool, an estimated number-right score was created using item response theory (IRT) scaling procedures; this score represents what the student would be predicted to score had he or she taken all 81 items in the original NELS:88 math test item pool. Therefore, scores range from 0 to 81.

In addition to presenting the overall math scores for graduates in 1992 and 2004, the effect size for change over time is presented. Effect size is a measure that standardizes differences so that they are comparable across studies and can be judged in the context of other research findings. To standardize the raw differences, they are divided by a measure of the variation in scores, the standard deviation (in this case, a pooled standard deviation across 1992 and 2004 graduates). The result indicates how much scores differ relative to the range of scores found for the original metric. Cohen (1988) provides guidelines for the magnitude of effect sizes, with 0.20 representing small effect sizes, 0.50 representing medium effect sizes, and 0.80 representing large effect sizes. In the context of secondary schooling, however, these guidelines are likely too large. For example, expressed as an effect size, the average annual math gain from grade 10 to 12 on a series of nationally standardized tests was reported as 0.075 (Bloom et al. 2008).[11] Calculations performed with ELS:2002 math scores suggest that the average annual gain across these two grades is larger, at about 0.17. However, this is still smaller than the Cohen "small" effect size. In the present discussion, effect size results are not identified as "small" or "large," but a 0.17 effect size growth can be considered a benchmark, representing about a year's worth of growth in late high school mathematics among ELS:2002 sample members.

[11] Calculated as the average of the grades 10–11 effect size of 0.15 and the grades 11–12 effect size of 0.01, p. 16.

Overall Mathematics Score

Table 17 shows the overall mathematics scores for 1992 and 2004 high school graduates.

- ***While math scores for occupational nonparticipants showed no statistically significant change over time, the scores for samplers, explorers, and concentrators all grew between 1992 and 2004.***

Occupational concentrators achieved a score of 45 in 1992 and 47 in 2004, for example. Table 18 shows the effect sizes for gains across the occupational coursetaking group, indicating that the effect size for occupational explorers and concentrators was particularly large—0.20 and 0.17, respectively, compared with 0.09 for samplers. The effect size results suggest that the mathematics achievement of occupational explorers and concentrators increased by about one year's worth of typical high school math growth in the 12 years between the studies.

Table 17. Average estimated number-right math scores of public high school graduates, by academic orientation and occupational coursetaking categories: 1982, 1992, and 2004

	Total		Academic orientation			
			Academic focus		General education	
Classification of occupational coursetakers	1992	2004	1992	2004	1992	2004
Noninvestors						
Nonparticipants	54.0	53.8	57.4	55.9	48.3	50.1
Samplers	50.0	51.3	54.6	53.8	45.4	47.4
Occupational investors						
Explorers	46.6	49.3	51.3	51.2	43.7	46.6
Concentrators	44.7	47.2	51.5	49.1	41.7	44.5

NOTE: Math scores represent the item response theory (IRT)-estimated number correct students would have answered had they received all test question in the NELS:88 test item pool; the scale runs from 0-81 and has been equated across the two years. Nonparticipants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table 18. Standardized mean difference (effect size) for the 1992 to 2004 change in math scores of public high school graduates, by occupational coursetaking category: 1992 and 2004

Group	1992	2004	Difference 2004-1992	Effect size
Total	49.3	50.6	1.3	0.09
Occupational coursetaking category				
Occupational noninvestor				
Nonparticipant	54.0	53.8	-0.2	-0.02
Sampler	50.0	51.3	1.3	0.09
Occupational investor				
Explorer	46.6	49.3	2.8	0.20
Concentrator	44.7	47.2	2.5	0.18

NOTE: Math scores represent the item response theory (IRT)-estimated number correct students would have answered had they received all test question in the test item pool; the scale runs from 0-81. Nonparticipants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table 17 also shows mathematics score changes for academic focus and general education graduates. Changes in math score for each occupational coursetaking group were similar among general education graduates: nonparticipants saw no statistically significant change, while samplers, explorers, and concentrators saw increases in math score over time. However, among academic focus students of any occupational coursetaking group, only nonparticipants saw a change: in fact, a decline from a score of 57 in 1992 to 56 in 2004.

- ***Thus, the overall changes in math scores for those with more occupational coursetaking involvement is driven by gains in scores among graduates with a general education curriculum.***

- ***However, in both 1992 and 2004, graduates with more occupational coursetaking involvement scored lower than their peers with less occupational coursetaking (with the exception of explorers versus concentrators in 1992).***

For example, in 1992, occupational nonparticipants scored 54 on the math assessment, compared with 45 for occupational concentrators. In 2004, that difference was 54 versus 47, respectively—a smaller gap than in 1992, but still lower for occupational concentrators.

Finally, although not all differences were statistically significant, the patterns for both academic focus and general education graduates were the same in each year: graduates with more occupational coursetaking involvement scored lower on the math test than graduates with less occupational coursetaking involvement.

6. POSTSECONDARY EDUCATION

Competitive challenges make it increasingly important that graduates have the higher-level skills and knowledge obtainable from postsecondary education. Even if graduates concentrate in occupational areas while in high school and do not plan to obtain a 4-year degree, many of the most rewarding positions in any field require further training and more advanced skills than what may be learned in high school. Examining the expectations and initial postsecondary education experiences of high school graduates can help elucidate the areas of success and weakness in occupational investors' high school training. This chapter further investigates differences and similarities between occupational coursetaking groups by characterizing the educational expectations of three cohorts of graduating seniors; it continues by describing their initial postsecondary education experiences (first 2 years after graduation) in terms of whether they were enrolled after high school, their enrollment intensity, whether they enrolled in 4-year institutions, and the timing and pattern of their enrollment.

Senior-year Educational Expectations

- ***For all occupational coursetaking groups, graduates' senior-year expectations have shifted from lower to higher levels of education over time, although occupational investors still have lower expectations than noninvestors.***

Each of the three surveys used for analyses in this report include data on public high school graduates' educational expectations while in the 12th grade; distributions of these expectations are shown in table 19. Across all occupational coursetaking groups, these distributions have shifted from lower expectations in 1982 to higher expectations in 2004. For example, the percentage of graduates expecting high school or less, as well as those expecting only some college (less than a 4-year degree), was lower in 2004 than in 1982 for all occupational coursetaking groups. At the same time, the percentage of those expecting to earn a graduate or professional degree increased from 1982 to 1992, and again from 1992 to 2004, among all occupational coursetaking groups. This same general shift toward higher educational expectations (and away from lower expectations) can also be seen in both academic orientation groups.

Table 19. Percentage of public high school graduates with given educational expectations in 12th grade, by academic orientation and occupational coursetaking category: 1982, 1992, and 2004

Occupational coursetaking category and educational expectations	Total			Academic orientation					
				Academic focus			General education		
	1982	1992	2004	1982	1992	2004	1982	1992	2004
Nonparticipants									
High school or less	7.5	1.0	2.9	4.3	0.7	1.7	8.9	1.6	4.8
Some college	24.7	15.1	12.8	21.8	10.7	9.8	25.9	21.9	17.9
Bachelor's degree	33.6	38.3	34.4	33.7	40.2	33.0	33.6	35.3	36.8
Graduate or professional degree	34.2	41.0	45.1	40.3	47.1	51.6	31.6	31.5	33.8
Don't know	—	4.6	4.9	—	1.3	3.8	—	9.7	6.8
Samplers									
High school or less	12.8	3.8	3.5	3.6	1.4	2.7	14.8	6.2	4.8
Some college	34.7	23.6	15.4	22.6	13.8	11.8	37.4	33.6	20.8
Bachelor's degree	28.9	35.7	36.0	35.6	37.6	36.6	27.4	33.7	35.1
Graduate or professional degree	23.6	32.8	38.3	38.1	44.1	44.4	20.4	21.3	29.0
Don't know	—	4.1	6.8	—	3.1	4.6	—	5.2	10.2
Explorers									
High school or less	18.0	4.0	5.1	8.2	1.3	4.2	18.9	5.6	6.3
Some college	46.4	34.3	22.7	27.0	24.9	17.6	48.2	40.0	29.7
Bachelor's degree	23.5	32.3	37.4	44.4	43.7	40.4	21.6	25.3	33.3
Graduate or professional degree	12.0	24.6	27.1	20.4	27.7	32.2	11.3	22.8	20.0
Don't know	—	4.8	7.8	—	2.4	5.6	—	6.2	10.8
Concentrators									
High school or less	28.9	9.5	8.3	9.6	8.1	7.3	29.9	10.0	9.8
Some college	49.6	40.5	27.9	41.3	23.4	23.4	50.1	47.5	34.0
Bachelor's degree	13.6	28.2	30.4	36.0	39.7	32.8	12.5	23.5	27.1
Graduate or professional degree	7.8	14.9	24.0	13.1	23.5	28.1	7.5	11.4	18.4
Don't know	—	7.0	9.4	—	5.3	8.4	—	7.6	10.7

— Not available

NOTE: Noninvestors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Despite this shift toward higher expectations, the educational expectations of occupational investors tended to be lower than those of noninvestors in each cohort. This can be illustrated by examining, for example, the modal expectation levels of 2004 12th-graders: the most commonly held educational expectations among occupational concentrators was some college or a bachelor's degree (reported by 28 percent and 30 percent of this group, respectively), and the modal expectation level for occupational explorers was a bachelor's degree

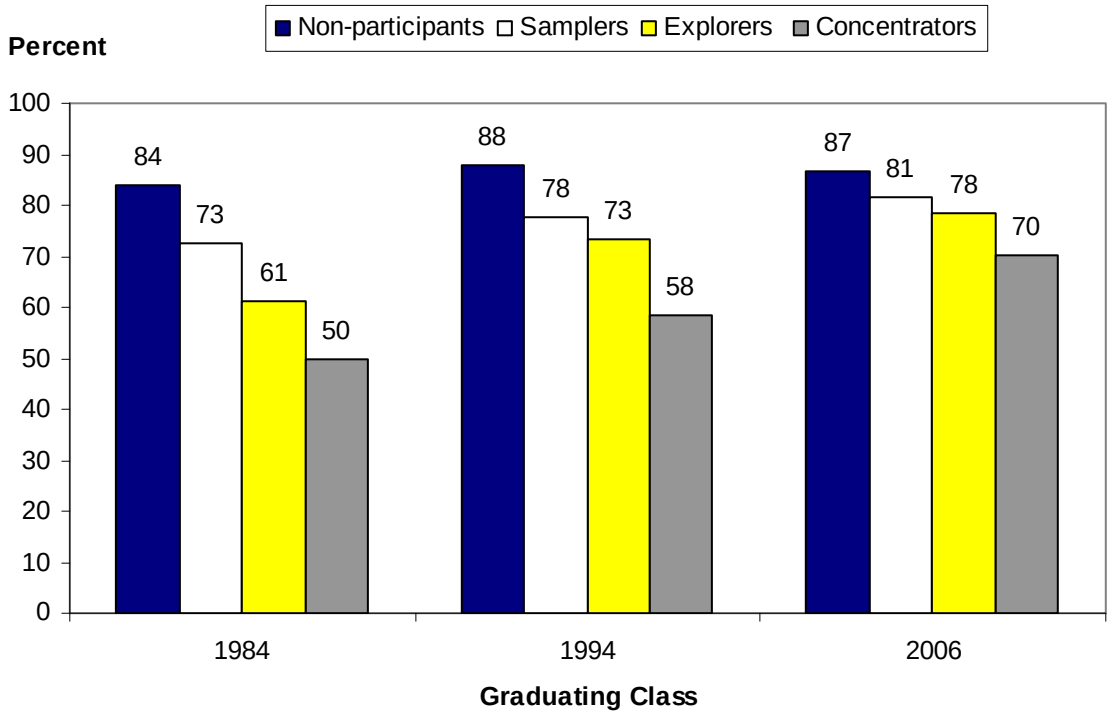
(38 percent). The modal expectations for noninvestors, however, was for higher levels of education: occupational samplers expected graduate degrees (38 percent) and bachelor's degrees (36 percent), while the single most commonly expected education level among occupational nonparticipants was a graduate or professional degree (45 percent).

Initial Postsecondary Education

Ever Attended Postsecondary School

In addition to information on 12th-grade educational expectations, the longitudinal datasets used in this report include a wealth of data on actual postsecondary education experiences. Figure 4 shows the percentages of various graduates who enrolled in a postsecondary institution at some point during their first 2 years after high school.

Figure 4. Percentage of public high school graduates ever enrolled in a postsecondary education institution in the first 2 years after graduation, by academic orientation and occupational coursetaking categories: 1982, 1992, and 2004



NOTE: Non-participants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/84), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992" and "Third Follow-up, 1994"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004" and "Second Follow-up, 2006."

- ***The initial postsecondary participation rates of occupational concentrators rose from 50 percent in 1984 to 70 percent in 2006, but their rates lagged behind those of occupational nonparticipants in all years.***

Although most occupational coursetaking groups made gains in terms of their initial postsecondary participation rates, they display varied patterns of increase (or stability) across the three studied time points. Rates for occupational concentrators increased steadily from 50 percent in 1984 to 58 percent in 1994 and 70 percent in 2006. The percent of occupational explorers and occupational samplers with initial postsecondary attendance increased from 1984 to 1994, but show no statistically significant differences between 1994 and 2006. Finally, the corresponding rates for occupational nonparticipants show no statistically significant differences between any of these points in time (in mid- to upper-80s in all years).

The overall numbers from figure 4 are presented in table 20 along with distributions for academic focus and general education curriculum graduates. Gains in initial postsecondary participation rates were seen primarily among high school graduates with a general education focus: rates for occupational explorers with a general education focus rose from 59 percent in 1984 to 67 percent in 1994 (and remained steady at 69 percent in 2006); rates for occupational concentrators with a general education focus were 49 percent in 1984 and 50 percent in 1994, but had risen to 65 percent by 2006.

Despite the gains made by occupational investors (especially by those with a general education focus), their rates lagged behind those of noninvestors at each studied time point. For example, rates for occupational concentrators were lower than those of occupational nonparticipants in 1984 (50 versus 84 percent), 1994 (58 versus 88 percent), and 2006 (78 versus 87 percent).

Table 20. Percentage of public high school graduates ever enrolled in a postsecondary education institution in the first 2 years after graduation, by academic orientation and occupational coursetaking categories: 1982, 1992, and 2004

				Academic orientation					
	Total			Academic focus			General education		
Classification of occupational coursetakers	1984	1994	2006	1984	1994	2006	1984	1994	2006
Noninvestors									
Nonparticipants	84.0	87.9	86.7	88.7	94.6	90.3	82.0	77.5	80.3
Samplers	72.7	77.8	81.5	89.0	87.6	87.0	69.2	67.8	73.2
Occupational investors									
Explorers	61.4	73.2	78.4	86.3	82.7	85.0	59.1	67.4	68.8
Concentrators	49.8	58.3	70.3	71.2	77.3	73.8	48.7	50.5	65.3

NOTE: Nonparticipants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/84), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992" and "Third Follow-up, 1994"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004" and "Second Follow-up, 2006."

Full-time Attendance Among College Attendees

- ***Rates of full-time attendance were fairly stable over time for all occupational coursetaking groups; however, within each cohort, occupational investors were generally less likely to attend full-time than were noninvestors.***

Table 21 provides additional detail on the initial postsecondary experiences of these three cohorts by characterizing the enrollment intensity of high school graduates who attended a postsecondary institution. Rates of initial full-time attendance were stable over time for all occupational coursetaking groups, with the exception of one statistically significant difference (80 percent of occupational explorers attended full-time by 1984, while 86 percent of occupational explorers did so by 2006).

Table 21. Percentage of college-attending 1982, 1992, and 2004 public high school graduates enrolled full-time at first postsecondary education institution after graduation, by academic orientation and occupational coursetaking categories: 1984, 1994, and 2006

				Academic orientation					
	Total			Academic focus			General education		
Classification of occupational coursetakers	1982	1992	2004	1982	1992	2004	1982	1992	2004
Noninvestors									
Nonparticipants	90.1	91.0	89.6	91.3	91.6	91.8	89.5	90.0	85.3
Samplers	85.8	86.5	86.0	94.3	92.1	89.3	83.4	79.0	79.9
Occupational investors									
Explorers	79.6	85.2	85.7	85.2	94.0	89.0	78.8	78.7	79.8
Concentrators	78.2	81.1	81.7	93.2	86.7	86.7	77.1	77.6	73.6

NOTE: Nonparticipants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/84), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992" and "Third Follow-up, 1994"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004" and "Second Follow-up, 2006."

Although enrollment intensity was, by and large, consistent over time within occupational coursetaking groups, there are significant differences across occupational coursetaking groups. Generally speaking, occupational investors who attended college were less likely to attend full-time than were noninvestors; for example, rates of initial full-time attendance for occupational concentrators were lower than those of occupational nonparticipants in all years (e.g., 82 versus 90 percent in 2006).

Four-year School Attendance Among College Attendees

- ***Occupational investors also made gains over time in their rates of first attending 4-year institutions, but were less likely to attend such institutions first than occupational noninvestors, in all years.***

As opposed to the general stability over time in rates of full-time attendance, there have been changes across cohorts in the percentages of college attendees who first attended 4-year institutions (see table 22). These changes have been most prevalent among occupational investors: for example, the percent of occupational explorers who first attended a 4-year institution was 40 percent among 1982 graduates, but had risen to 50 percent among 1992 graduates (and held steady at 52 percent among 2004 graduates). The corresponding rate for occupational concentrators was 50 percent in 2006, a significant increase from their rates in 1984 (35 percent) and 1994 (39 percent). Meanwhile, the percentages of occupational nonparticipants who first attended a 4-year institution showed no statistically significant difference over time.

Table 22. Percentage of college-attending public high school graduates first enrolling in a four-year postsecondary institution after graduation, by academic orientation and occupational coursetaking categories: 1982, 1992, and 2004

				Academic orientation					
	Total			Academic focus			General education		
Classification of occupational coursetakers	1982	1992	2004	1982	1992	2004	1982	1992	2004
Noninvestors									
Nonparticipants	64.2	70.8	68.7	72.5	78.7	75.0	60.4	55.5	56.2
Samplers	55.5	59.1	60.9	70.8	71.1	67.8	51.3	42.7	48.5
Occupational investors									
Explorers	40.5	49.5	51.5	65.0	66.0	59.2	37.2	37.1	37.8
Concentrators	34.7	39.2	49.6	64.0	53.0	57.3	32.5	30.4	37.1

NOTE: Nonparticipants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/84), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992" and "Third Follow-up, 1994"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004" and "Second Follow-up, 2006."

When examining trends by academic orientation group, there is only one statistically significant difference—the rate of first attending a 4-year institution among occupational samplers with a general education focus was 51 percent for 1982 graduates and 43 percent for 1992 graduates. Otherwise the trends for each academic orientation group were similar to the overall population.

As with their gains in initial postsecondary participation rates, the gains made by occupational investors in terms of first attendance at 4-year institutions did not overcome their lower rates compared with noninvestors: at each studied time point, the rates for investors lagged behind their noninvestor counterparts. The percent of occupational concentrators who first attended a 4-year institution was lower than that of occupational nonparticipants in 1984 (35 percent versus 64 percent), 1994 (39 percent versus 71 percent), and 2006 (50 percent versus 69 percent). The same pattern held for both academic focus and general education graduates who attended college.

Postsecondary Attendance Pattern Among College Attendees

Table 23 provides estimates describing postsecondary enrollment patterns in terms of the timing of respondents' first enrollment (whether immediate or delayed after graduation), and their enrollment 2 years later (enrolled or not enrolled). Immediate enrollment as used in this report refers to postsecondary attendance which began by the fall of the graduation year (if the graduation date was in the spring), or by the following spring (if the high school graduation date was in the fall); delayed enrollment describes postsecondary attendance which does not meet the criteria for immediate enrollment. Enrollment 2 years later is defined by whether the respondent was enrolled in a postsecondary school at any point in 1984 (for HS&B respondents), 1994 (for NELS:88 respondents), or 2006 (for ELS:2002 respondents).

- ***Immediate college enrollment rates were stable for occupational noninvestors, but were higher for investors in 2004 compared with 1982 or 1992; noninvestors (both samplers and nonparticipants) had higher rates of immediate enrollment than do occupational concentrators in all three cohorts.***

- ***Greater percentages of 1992 and 2004 graduates than 1982 graduates were still enrolled in college 2 years after graduation, regardless of occupational coursetaking group. Noninvestors, however, were more likely to remain enrolled 2 years after graduation than were investors at all three time points.***

Rates of immediate enrollment showed no statistically significant change over time among occupational noninvestors. Among occupational investors, the percentages of 2004 graduates with immediate enrollment was higher than that of 1982 or 1992 graduates: the immediate enrollment rate for occupational explorers was 88 percent in 2004 (an increase over their 1982 and 1992 rates of 82 percent and 84 percent, respectively), and the immediate enrollment rate for concentrators was 84 percent in 2004 (an increase over their 1982 and 1992 rates of 79 percent and 80 percent, respectively). No statistically significant changes over time are detectable when occupational coursetaking groups are examined by academic orientation.

Occupational concentrators had lower rates of immediate enrollment than did occupational noninvestors (both nonparticipants and samplers) in all three cohorts: for example, the rate for concentrators was 84 percent in 2004, versus 87 percent for samplers and 91 percent for nonparticipants. Occupational explorers had a lower immediate enrollment rate in 1982 than did occupational noninvestors (both nonparticipants and samplers), but in 1992 and 2004 there were no differences between explorers and noninvestors.

Table 23. Initial postsecondary education enrollment patterns of college-attending public high school graduates, by academic orientation and occupational coursetaking category: 1982, 1992, and 2004

Occupational coursetaking category and initial enrollment pattern	Total			Academic orientation					
				Academic focus			General education		
	1982	1992	2004	1982	1992	2004	1982	1992	2004
Nonparticipants									
% enrolled immediately after graduation	91.4	88.0	90.7	95.0	91.1	93.0	89.8	82.1	86.1
% enrolled 2 years after graduation	77.2	86.9	83.6	84.1	89.0	86.0	74.0	82.8	78.8
Samplers									
% enrolled immediately after graduation	86.6	87.1	86.9	93.1	91.7	90.6	84.8	81.1	80.3
% enrolled 2 years after graduation	72.5	83.3	81.2	81.0	89.1	84.5	70.1	75.7	75.5
Explorers									
% enrolled immediately after graduation	82.0	83.5	87.8	80.5	85.6	90.5	82.2	81.9	83.0
% enrolled 2 years after graduation	62.2	76.5	76.9	80.3	85.5	79.7	59.8	70.0	71.8
Concentrators									
% enrolled immediately after graduation	78.7	79.6	84.2	85.1	84.9	87.4	78.2	76.2	79.0
% enrolled 2 years after graduation	58.5	73.2	74.8	71.8	77.6	78.5	57.4	70.4	68.9

NOTE: Noninvestors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/84), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992" and "Third Follow-up, 1994"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004" and "Second Follow-up, 2006."

In terms of the percentages of college-attending high school graduates who remain enrolled 2 years later, the percentage remaining enrolled 2 years later was higher for 1992 and 2004 graduates than for 1982 graduates, for all occupational coursetaking groups (there were no changes within occupational coursetaking groups between 1992 and 2004).

In all three cohorts, occupational nonparticipants and samplers who had ever attended college were enrolled 2 years later at higher rates than occupational explorers and concentrators. For example, in 2006, 84 percent of nonparticipants and 81 percent of samplers were enrolled 2 years later, while only 77 percent of explorers and 75 percent of concentrators were.

7. POSTSECONDARY EMPLOYMENT

In addition to providing information on trends in secondary and postsecondary education experiences, the studies used in this report allow for examination of trends in secondary and postsecondary work experiences. Because one of the main goals of career and technical education is to prepare students for immediate work after high school, the occupational expectations and initial post-high school work experiences are important outcomes to consider in evaluating trends in occupational coursetaking. However, because ELS:2002 has to date only surveyed its graduates once after high school, the only comparable information across the three cohorts studied here is restricted to the initial 2 years after graduation. Given that entering the labor force can be a multiyear transition for many high school graduates, even those who do not attend college, these initial experiences represent only part of the association between occupational coursetaking and work outcomes. Nevertheless, some occupational expectations and outcomes can be examined. In this chapter, both senior-year expectations and experiences and occupational experiences after high school are discussed.

Senior-year Occupational Expectations, Goals, and Work

Senior-year Occupational Expectations

- ***In each cohort, professional occupations were the most frequently reported expectation for occupation at age 30; moreover, the percentage of 12th-graders with this particular expectation increased over time.***
- ***In each cohort, occupational noninvestors were more likely to have expectations of a professional occupation than were investors, and investors were more likely to expect working as a craftsman.***

Table 24 displays percentage distributions for each cohort's senior-year expectations of occupation at age 30 (because of the number of occupational expectations categories, breakdowns by academic orientation are not presented). In each cohort, professional occupations were the most frequently reported expectation for occupation at age 30; moreover, the percentage of 12th-graders with this particular expectation grew over time. For example, among occupational concentrators, the percent of 12th-graders expecting a professional occupation at age 30 increased from 23 percent in 1982 to 37 percent in 1992 and 48 percent in 2004. Despite this increase over time within each coursetaking group, it should be noted that at each studied time point, greater percentages of noninvestors held expectations of professional occupations than did occupational investors.

Table 24. Percentage of public high school graduates with given expectations of occupation at age 30, by occupational coursetaking category: 1982, 1992, and 2004

	Occupational noninvestor			Occupational investor					
				Explorer			Concentrator		
Occupational expectation	1982	1992	2004	1982	1992	2004	1982	1992	2004
Clerical	4.6	2.1	0.5	6.7	4.2	0.6	17.2	6.6	0.7
Craftsmen	3.4	0.7	2.7	6.0	2.4	5.2	12.8	8.4	11.4
Farmer	1.0	0.4	‡	2.2	0.9	0.2	4.1	2.9	1.1
Homemaker	2.2	0.9	‡	2.3	1.2	‡	2.7	0.5	#
Laborer	0.8	0.1	0.3	0.9	1.3	0.8	1.3	1.0	1.2
Manager	9.0	3.7	3.9	8.4	5.0	4.2	7.0	5.9	5.6
Military	1.8	1.9	1.5	2.5	1.9	1.3	2.3	3.7	2.0
Operative	1.7	1.4	0.1	2.7	0.5	1.0	5.0	3.6	2.4
Professional	51.9	59.8	69.5	35.7	48.7	58.7	22.9	36.6	47.9
Proprietor	3.4	4.9	3.2	4.2	5.9	3.6	5.5	6.5	6.2
Protective services	1.5	3.6	4.2	1.5	5.1	3.7	1.8	3.6	3.4
Sales	2.0	2.1	1.9	2.5	1.7	2.1	1.3	0.9	1.5
Service	2.9	2.3	6.1	3.8	3.3	7.1	4.3	3.9	6.8
Technical	11.2	5.6	5.3	17.1	8.0	10.2	8.3	7.4	9.0
Other	2.7	10.6	0.6	3.7	10.0	1.1	3.5	8.5	1.0

‡ Reporting standards not met

Rounds to zero

NOTE: Noninvestors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Another noteworthy trend is the precipitous drop in expectations of clerical occupations; for example, the percent of occupational explorers and concentrators expecting a clerical occupation dropped from 7 percent and 17 percent (respectively) in 1982 to about 1 percent in 2004 for both groups.

In each cohort, there were greater percentages of occupational investors who expected to be in craftsmen occupations than there were among noninvestors (e.g., in 2004, 11 percent of occupational concentrators held this expectation, while only 3 percent of noninvestors did so). Likewise, in 1982 and 2004, there were greater percentages of investors who expected to be in technical occupations than there were among noninvestors (e.g., in 2004, 9 percent of occupational concentrators held this expectation, while only 5 percent of noninvestors did so).

Senior-year Work Goals

- ***In each cohort, "being successful in a line of work" and "being able to find steady work" were rated as very important goals by higher percentages of each occupational coursetaking group than was "having lots of money."***

In addition to thinking about what kind of occupation they would have in the future, graduates were asked to rate the importance of three work-related goals, shown in table 25. High percentages (at least 85 percent) of all four occupational coursetaking groups in each of the three graduating classes rated "being successful in a line of work" as very important. The percentage of graduates rating this goal as very important was higher in 2004 than in 1982 for all occupational coursetaking groups except nonparticipants; within cohorts, however, no statistically significant differences were seen between occupational coursetaking groups, either overall or by academic orientation.

Table 25. Percentage of public high school graduates stating that the given work goal was "very important," by academic orientation and occupational coursetaking category: 1982, 1992, and 2004

				Academic orientation					
	Total			Academic focus			General education		
Work goal and occupational coursetaking category	1982	1992	2004	1982	1992	2004	1982	1992	2004
Having lots of money									
Nonparticipants	28.1	32.7	28.2	25.2	29.4	27.2	29.2	37.6	30.0
Samplers	30.5	34.3	35.4	26.6	31.6	34.5	31.4	37.0	36.7
Explorers	32.7	41.7	38.0	16.9	44.0	36.7	34.1	40.4	39.8
Concentrators	30.3	43.1	37.4	34.0	47.9	38.3	30.1	41.2	36.1
Being able to find steady work									
Nonparticipants	85.8	84.5	85.5	82.7	84.7	86.5	87.1	84.1	83.7
Samplers	85.8	87.9	88.4	86.3	88.4	88.2	85.7	87.4	88.6
Explorers	88.0	89.9	88.0	89.6	92.3	88.0	87.8	88.4	88.0
Concentrators	86.6	90.5	89.2	77.3	91.6	90.2	87.1	90.1	87.8
Being successful in a line of work									
Nonparticipants	88.7	88.1	91.8	86.6	88.4	93.4	89.6	87.6	88.9
Samplers	87.6	89.6	93.0	90.0	90.4	93.6	87.0	88.8	91.9
Explorers	86.8	86.9	91.1	83.5	87.8	91.8	87.1	86.3	90.2
Concentrators	87.4	90.8	92.3	82.7	92.6	93.6	87.6	90.0	90.6

NOTE: Noninvestors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

"Being able to find steady work" was also rated as very important by at least 85 percent of each occupational coursetaking group in each cohort. These rates remained fairly steady over time; comparing 1982 and 2004 graduates, only occupational samplers experienced a statistically significant change in the percentage rating "being able to find steady work" as very important, from 86 to 88 percent. No differences are seen within academic orientation-occupational coursetaking groups when comparing 1982 and 2004 graduates.

Relative to the two work-related goals just discussed, "having lots of money" was rated as very important by much lower percentages of graduates—in fact, fewer than 50 percent of all occupational coursetaking and/or academic orientation groups did so. It is worth noting, though, that differences have emerged over time between the percentages of investors and noninvestors rating this goal as very important. In 1982, there were no statistically significant differences between occupational coursetaking groups. In 1992 and 2004, however, investors were more likely than noninvestors to rate "having lots of money" as very important.

Senior-year Hours Worked

- ***When comparing 1992 and 2004, there has been a shift toward more hours worked per week during the senior year; occupational concentrators, however, reported working more hours per week than nonparticipants.***

The two most recent studies used in analyses for this report (NELS:88 and ELS:2002) include information on the number of hours worked by high school graduates during their senior year; distributions by occupational coursetaking group and academic orientation are shown in table 26. When comparing 1992 and 2004, each occupational coursetaking group experienced either a statistically significant decrease in the percent of graduates who did not work during their senior year (samplers, explorers, and concentrators), or a statistically significant increase in the percent of graduates who worked 16 hours per week or more during their senior year (nonparticipants and explorers).

Despite this shift over time, there remain detectable intra-cohort differences between occupational concentrators and nonparticipants. Occupational concentrators were more likely to work 16 hours per week or more than were occupational nonparticipants in both 1992 (53 percent versus 27 percent) and 2004 (55 percent versus 37 percent), for example. This same pattern is seen within academic orientation groups, with one exception: in 1992, there was no statistically significant difference in the percentage of academically oriented concentrators and nonparticipants who did not work.

Table 26. Percentage of public high school graduates with given employment experiences, by academic orientation and occupational coursetaking category: 1982, 1992, and 2004

Occupational coursetaking category and work experiences	Total		Academic orientation			
			Academic focus		General education	
	1992	2004	1992	2004	1992	2004
Nonparticipants						
Weekly hours spent working in senior year						
Did not work	32.2	27.2	30.3	26.2	35.2	28.9
1-15 hours	41.0	35.9	43.5	36.3	37.0	35.3
16 or more hours	26.8	36.9	26.2	37.5	27.8	35.8
Samplers						
Weekly hours spent working in senior year						
Did not work	28.4	24.3	28.9	23.7	27.8	25.4
1-15 hours	29.3	30.7	34.9	32.8	23.5	27.5
16 or more hours	42.3	45.0	36.2	43.5	48.7	47.1
Explorers						
Weekly hours spent working in senior year						
Did not work	27.8	21.3	30.4	21.0	26.1	21.7
1-15 hours	32.6	31.2	34.7	31.4	31.2	30.9
16 or more hours	39.7	47.5	34.9	47.6	42.7	47.4
Concentrators						
Weekly hours spent working in senior year						
Did not work	24.6	19.0	26.8	18.6	23.7	19.5
1-15 hours	22.5	26.0	25.7	28.2	21.3	23.0
16 or more hours	52.8	55.0	47.6	53.2	55.0	57.5

— Not available.

NOTE: Noninvestors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Postsecondary Employment

Ever Worked for Pay

Each of the three surveys asked respondents whether they had worked for pay at some point during the first 2 years after high school graduation. Respondents are counted as "ever employed in the first 2 years after graduation" if they had worked during that time span, regardless of whether they also attended postsecondary school. Results are shown in table 27.

Table 27. Percentage of 1982, 1992, and 2004 public high school graduates ever employed in the first 2 years after graduation, by academic orientation and occupational coursetaking categories: 1984, 1994, and 2006

	Total			Academic orientation					
				Academic focus			General education		
Classification of occupational coursetakers	1984	1994	2006	1984	1994	2006	1984	1994	2006
Noninvestors									
Nonparticipants	93.3	88.9	92.5	93.5	90.2	93.5	93.2	87.0	90.6
Samplers	93.4	94.3	93.4	93.6	93.9	94.0	93.4	94.8	93.5
Occupational investors									
Explorers	95.0	93.1	94.2	97.0	91.1	93.4	94.8	94.4	95.3
Concentrators	94.7	94.0	94.0	93.9	96.1	94.2	94.7	93.2	93.7

NOTE: Nonparticipants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/84), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992" and "Third Follow-up, 1994"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004" and "Second Follow-up, 2006."

- ***At least 87 percent of each cohort worked for pay within their first 2 years after high school graduation, regardless of occupational coursetaking and academic orientation.***

Regardless of high school academic orientation or occupational concentration, the vast majority of these recent graduates had at some point undertaken paid employment: in each cohort, at least 87 percent of graduates had worked for pay within the first 2 years after high school. Furthermore, within each cohort, there are no statistically significant differences across occupational coursetaking groups, either overall or by academic orientation.

Number of Months Employed Among Non-College Attendees

- ***The number of months employed during the first 2 years after high school have not detectably changed over time. Occupational concentrators in the 1992 and 2004 cohorts averaged more months of employment than did their noninvestor counterparts.***

Detailed employment histories were also collected from respondents in each of the three cohorts, allowing for calculation of the number of months employed during their first 2 years after high school (results are shown in table 28). No statistically significant changes over time are noted within any of the four occupational coursetaking groups, with one minor exception: 1992 occupational explorers averaged 13 months of employment, while 2004 explorers averaged 14 months of employment.

Table 28. Average number of months non-college-attending 1982, 1982, and 2004 public high school graduates were employed in first two 2 years after graduation, by academic orientation and occupational coursetaking categories: 1984, 1994, and 2006

	Total			Academic orientation					
				Academic focus			General education		
Classification of occupational coursetakers	1984	1994	2006	1984	1994	2006	1984	1994	2006
Noninvestors									
Nonparticipants	13.2	11.5	12.6	13.8	11.4	13.2	13.1	11.5	12.1
Samplers	13.1	12.9	12.5	12.5	11.8	13.1	13.2	14.4	12.1
Occupational investors									
Explorers	13.1	12.6	13.8	15.8	11.6	13.8	13.0	13.3	13.8
Concentrators	14.1	14.1	14.0	15.1	13.6	13.6	14.1	14.4	14.5

NOTE: Nonparticipants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/84), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992" and "Third Follow-up, 1994"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004" and "Second Follow-up, 2006."

In contrast to the stability within coursetaking groups, detectable intra-cohort differences developed over time among these coursetaking groups. In 1984, there were no statistically significant differences between groups, either overall or by academic orientation. By 1994, however, occupational concentrators averaged more months of employment during their first 2 years after high school (14) than did explorers (13 months), samplers (13 months), or nonparticipants (12). This same pattern is evident within both 1992 academic orientation groups. In 2006, concentrators averaged more months of employment (14) than did samplers and nonparticipants (13 months each), but were no different than occupational explorers. No differences were detected across occupational coursetaking groups among 2004 academically oriented graduates; however, 2004 occupational concentrators with a general education focus averaged more months of employment (15) than did their noninvestor peers (12 months).

First Job Type Among Non-College Attendees

HS&B, NELS:88, and ELS:2002 respondents who had no postsecondary attendance in their first 2 years after high school answered a series of questions regarding their first post-high school job, including the type of job they first held after high school; distributions of these first-job types are shown in table 29.

- ***Sales/service was the most commonly reported first-job type among all coursetaking groups in 1984 and 2006.***
- ***In each cohort, occupational concentrators were more likely than noninvestors to have a first-job type of craftsperson; in the most recent cohort, they were more likely to have a first-job type of laborer/farmer and skilled operative. In 1994 and 2006, noninvestors were more likely than concentrators to have a sales/service first-job type.***

In 1984 and 2006, the most commonly reported first job type among nonenrollees across all occupational coursetaking groups was sales/service. While still prevalent in 1994, there was no statistically significant difference between sales/service and laborer/farmer within any coursetaking group. Moreover, the prevalence of sales/service first-job types has grown in the most recent cohort, at least among noninvestors and occupational concentrators: in 2006, fully 50 percent of noninvestors' first-job type was sales/service (compared with 38 percent in 1984 and 33 percent in 1994), while 37 percent of concentrators' first job type was sales/service (compared to 30 percent in 1984 and 24 percent in 1994).

Table 29. Percentage of non-college-attending public high school graduates in first job type, by occupational coursetaking category: 1984, 1994, and 2006

	Occupational noninvestor			Occupational investor					
				Explorer			Concentrator		
Type of first job	1984	1994	2006	1984	1994	2006	1984	1994	2006
Clerical	18.0	25.5	13.3	15.2	17.7	15.1	19.9	21.2	11.9
Craftsperson	6.5	3.3	6.9	7.8	8.2	9.6	11.7	9.9	13.1
Laborer/farmer	14.0	21.3	8.4	13.6	19.5	10.6	16.8	22.4	15.7
Skilled operative	11.5	5.4	6.8	12.1	6.3	10.4	11.7	9.2	11.8
Sales/service	37.2	32.9	50.4	39.2	31.4	41.2	30.5	23.6	37.8
Managerial	3.3	5.2	6.4	5.3	7.6	6.0	1.9	5.1	4.8
Other	9.5	6.5	7.7	6.8	9.3	7.1	7.7	8.7	5.0

NOTE: Noninvestors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/84), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992" and "Third Follow-up, 1994"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004" and "Second Follow-up, 2006."

In each cohort, occupational concentrators were more likely than noninvestors to have a first-job type of craftsperson (12 versus 7 percent in 1984, 10 versus 3 percent in 1994, and 13 versus 7 percent in 2006). In the most recent cohort, occupational concentrators were also more likely than noninvestors to have a first-job type of laborer/farmer (16 versus 8 percent) and skilled operative (12 versus 7 percent). Noninvestors, on the other hand, were more likely than concentrators to have a sales/service first-job type in both 1994 (37 versus 30 percent) and 2006 (50 versus 38 percent). No statistically significant differences were seen between occupational concentrators and occupational explorers within any cohort.

Gender and Occupation Among Non-College Attendees: 2004

The ELS:2002 dataset includes further specificity on first job types in the form of O*NET (Occupational Information Network) job codes. By cross-referencing these detailed job codes with national-level information from the Bureau of Labor Statistics (BLS 2006), it is possible to estimate the percentage of 2004 graduates whose first job (and the job held 2 years after graduation) was in an opposite-sex-dominated field (table 30). For the purposes of this report, female-dominated job types simply refer to jobs where more than 50 percent of employees nationwide are female, and male-dominated job types refer to jobs where more than 50 percent of employees nationwide are male. See appendix A for more information.

Table 30. Percentage of non-college-attending public high school graduates whose job(s) after graduation were in an opposite-sex-dominated field, by academic orientation and occupational coursetaking classification: 2004–2006

Occupational coursetaking category and sex composition of field	Total	Academic orientation	
		Academic focus	General education
Nonparticipants			
Women in male-dominated occupation			
First job after graduation	68.7	64.8	73.8
Job two years after graduation	76.0	75.4	76.9
Men in female-dominated occupation			
First job after graduation	21.9	19.5	23.7
Job two years after graduation	28.4	28.3	28.6
Samplers			
Women in male-dominated occupation			
First job after graduation	75.0	76.6	73.6
Job two years after graduation	74.3	80.1	68.6
Men in female-dominated occupation			
First job after graduation	29.0	29.7	28.5
Job two years after graduation	29.7	33.2	26.8
Explorers			
Women in male-dominated occupation			
First job after graduation	72.7	69.3	75.3
Job two years after graduation	71.6	73.7	69.7
Men in female-dominated occupation			
First job after graduation	27.3	25.8	28.5
Job two years after graduation	18.7	18.9	18.5
Concentrators			
Women in male-dominated occupation			
First job after graduation	76.7	80.1	72.7
Job two years after graduation	80.8	77.1	84.4
Men in female-dominated occupation			
First job after graduation	18.4	20.9	16.1
Job two years after graduation	15.0	16.0	13.9

NOTE: Noninvestors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004" and "Second Follow-up, 2006"

- ***Regardless of occupational coursetaking group and/or academic orientation, women were more likely to be employed in a male-dominated occupation than were men to be employed in a female-dominated occupation.***

Regardless of occupational coursetaking group and/or academic orientation, women were more likely to be employed in a male-dominated occupation than were men to be employed in a female-dominated occupation. This holds true for 2004 graduates' first job after high school, as

well as the job they held 2 years after high school. For example, 77 percent of female concentrators' first jobs after high school were in male-dominated occupations, compared to 18 percent of male concentrators' first jobs in a female-dominated occupation.

In terms of their first job after high school, the percentage of male occupational concentrators employed in female-dominated occupations (18 percent) was lower than that of male occupational samplers and explorers employed in female-dominated occupations (29 and 27 percent, respectively), although not statistically different from nonparticipants. In terms of their job 2 years after high school, the percentage of male occupational concentrators employed in female-dominated occupations (15 percent) was lower than that of male nonparticipants and samplers employed in female-dominated occupations (28 and 30 percent, respectively), although not statistically different from explorers. No differences across coursetaking groups were detected in regard to the percentage of females in male-dominated occupations, regardless of job sequence.

8. CONCLUSION

There are two main findings emerging from the analyses presented in this report. First, there has been a decisive shift among most high school graduates away from intense involvement in occupational coursetaking and toward academic coursetaking. Fewer graduates concentrated in occupational coursetaking by earning 3 or more credits in a single occupational area: in 1982, 30 percent of all graduates were occupational concentrators, compared with 17 percent in 2004. At the same time, but mainly between 1982 and 1992, graduates increasingly met the requirements originally set out in the 1983 *A Nation at Risk* report, earning four credits in English, and three each in mathematics, science, and social studies. The share of the graduating class meeting this requirement increased from 15 percent in 1982 to 60 percent in 2004.

This overarching shift toward academic coursework did not mean that occupational coursetaking as a whole was abandoned, however. Indeed, the percentage of graduates earning at least 1 credit in an occupational course remained relatively stable over the three cohorts: 82 percent earned at least 1 credit in an occupational course in 1982, compared with 81 percent in 2004. And although the average number of occupational credits earned declined over time, this was primarily because of the decline in occupational concentrators. Occupational coursetaking actually became more widespread over these three decades, which is the second main finding of this report.

Greater proportions of graduates "sampled" or "explored" occupational courses in later cohorts. Samplers, earning 1 to 3 occupational credits, grew from 36 percent of all graduates in 1982 to 42 percent in 2004; explorers, earning 3 or more occupational credits without concentrating their studies in a particular occupational area, grew from 16 percent of all graduates in 1982 to 21 percent in 2004.

In combination with the shift toward academic coursetaking, the growth in lower-level occupational coursetaking indicates the merging of academic and occupational coursetaking involvement. Occupational samplers, explorers, and concentrators made up an increasingly larger share of all academically oriented graduates over time, while general education graduates with occupational involvement dwindled. To this extent, given the priority placed on academic requirements and the shift toward more and higher-level academic coursetaking, occupational coursetaking appears to have become more like an exploratory endeavor than a concentrated effort to prepare for a career immediately after high school.

These trends have coincided with improved achievement outcomes (as measured by mathematics test score) and more involvement in postsecondary education. Occupational investors who had not focused on academic studies otherwise (i.e., general education graduates) earned more credits in math, science, and social studies in 2004 than 1982. And although increased academic coursetaking likely contributes to decreased occupational coursetaking (the number of academic credits earned rose over time, and the students taking more academic credits typically took fewer occupational or CTE credits), the relationship between the two weakened over time—academic coursetaking was not as closely associated with diminished CTE or occupational coursetaking in 2004 compared with earlier cohorts. Further, occupational investors

were increasingly prepared for college and attended 4-year colleges at higher rates in later years. Occupational investors' postsecondary work experiences did not change substantially over time, however.

While this study has strengths in terms of presenting nationally representative, cross-cohort comparable results based on rigorous coding of specific courses taken, there are limitations on what the results can indicate. As noted in chapter 2, coursetaking is one dimension of high school CTE—the most important dimension, perhaps, but other factors such as participation in specific programs such as cooperative education, or whether the school is explicitly geared to serve CTE or occupational students as a vocational school, career academy, or similar, affect the experience of students and their likely outcomes. Further, because this is a study of high school graduates, there may be students with delayed graduation or who dropped out altogether who had different coursetaking experiences. The findings about the increasing academic readiness of occupational investors should be considered in this light.

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Appendix A. Technical Notes

A.1 Overview of the Technical Notes

The first section of this appendix gives further information about the design and content of the three studies whose data are drawn upon in this report: High School and Beyond (HS&B), the National Education Longitudinal Study of 1988 (NELS:88), and the Education Longitudinal Study of 2002 (ELS:2002). This section is followed by information about the basic statistical design of the surveys, response rates, and the specific weights and target populations that were used to produce the estimates in this report. Next, the procedures used to determine the statistical significance of the results are described. A bias analysis relevant to results presented in chapter 6 follows. Finally, a glossary provides detailed descriptions of the construction of all variables used in the report. Standard errors for tables in this appendix may be found at the end of appendix B.

A.2 Description of Studies

Since 1972, the National Center for Education Statistics (NCES) has conducted a series of national-level longitudinal studies of high school students. The aim of these studies is to examine the educational, vocational, and personal development of students at various stages in their educational careers and the personal and contextual factors that may affect that development. The high school longitudinal studies consist of three completed studies, one ongoing study, and one study currently being implemented. The completed studies comprise the National Longitudinal Study of 1972 (NLS:72), HS&B, and NELS:88. In addition, base-year, first follow-up, and second follow-up data are available for the ongoing ELS:2002, which is the fourth longitudinal study in the series. A new study, the High School Longitudinal Study of 2009 (HSLS:09), has also just begun.

For the current report, HS&B, NELS:88, and ELS:2002 serve as the primary sources of information. HS&B involved surveys of two populations: the senior class of 1980 and the sophomore class of 1980. Because of limitations on the types of data available from the 1980 senior sample, the HS&B sophomore study is used here (see below for further explanation). NLS:72 is not used in the current report because it did not collect high school transcripts for its subjects.

Each of the three studies used in this report is described in turn.

A.2.1 High School and Beyond

HS&B—the second in the series of NCES high school longitudinal studies—was launched in 1980. HS&B included a cohort of high school seniors and a cohort of high school sophomores from 1980. This report uses questionnaire data collected from the 1980 sophomore cohort during the first follow-up in 1982, and transcript data collected from high schools. Base-year (1980) data collection took place in the spring term of the 1979–80 academic year with a two-stage probability sample. Some 1,015 schools served as the first-stage units, and 35,723

sophomores and 34,981 seniors within these schools were the second-stage units and eligible to participate (of whom about 58,000 total participated in the base year). Subsamples of both cohorts of HS&B were resurveyed in 1982, 1984, and 1986; the sophomore cohort also was surveyed in 1992. High school transcripts were collected for a subsample of approximately 15,941 sophomore cohort members in the 1982 first follow-up, when most were seniors. In addition, to better understand the school and home contexts for the sample members, data were collected from teachers (a teacher comment form in the base year asked for teacher perceptions of HS&B sample members), principals, and a subsample of parents.

A.2.2 National Education Longitudinal Study of 1988

NELS:88 represents an integrated system of data that tracked students from junior high or middle school through secondary and postsecondary education, labor market experiences, and marriage and family formation. Data collection for NELS:88 was initiated with the 8th-grade class of 1988 in the spring term of the 1987–88 school year. Along with a student survey, NELS:88 included surveys of parents (base-year and second follow-up), teachers (base-year, first follow-up, and second follow-ups), and school administrators (base-year, first follow-up, and second follow-ups). The sample was also surveyed after scheduled high school graduation, in 1994 and 2000. Because of the complexity of NELS:88 design, each survey wave is described in turn.

NELS:88 base year (BY). The NELS:88 base year (1988) successfully surveyed 24,599 students, out of some 26,432 selected 8th-graders, across 1,052 public, Catholic, and other private schools. In addition to filling out a questionnaire, students also completed assessments in four subjects (reading, mathematics, science, and social studies). The base year also surveyed one parent, two teachers, and the principal of the school a student attended.

NELS:88 first follow-up (F1). A first follow-up took place in 1990. At that time, student cohort members, their teachers, and their principals were resurveyed. In addition, the sample was freshened by adding new members to obtain a nationally representative sample of the high school sophomore class of 1990, and to allow cohort comparisons between the NELS:88 sophomores and the HS&B sophomores. The first follow-up gathered data from 18,221 participating students (not including dropouts, who were followed with certainty), including 797 new sample members from grade 10. Of this total sample, 18,176 were sophomores.

NELS:88 second follow-up (F2). The second follow-up took place in the spring term of the 1991–92 school year, when most sample members were in their final semester of high school. As with the first follow-up, the second follow-up was freshened with additional members to produce a nationally representative sample of the senior class of 1992. In addition, high school transcripts were collected for a subsample of respondents. This follow-up provided a culminating measurement of learning in the course of secondary school and also collected information to facilitate investigation of the transition into the labor force and postsecondary education after high school. Eighth-graders or 10th-graders from the base-year or first-follow-up samples who dropped out or were not 12th-graders in 1992 are not included in the current study.

NELS:88 third and fourth follow-ups (F3 and F4). The third follow-up took place in 1994 when most sample members had completed high school. The fourth follow-up took place in 2000

when most sample members who had attended technical schools or college had completed their postsecondary education. The fourth follow-up also included a postsecondary transcripts study.

A.2.3 Education Longitudinal Study of 2004

This study uses ELS:2002 data from first follow-up (F1) and second follow-up (F2) surveys, and the high school transcript study. These components and the base-year study are briefly described in turn.

Base-year Survey. ELS:2002 sampled 10th-graders in the spring term of the 2001–02 school year. Of the 17,590 eligible students, 15,360 completed a survey about their school and home experiences (for an 87 percent weighted response rate, based on eligible students). Of the 15,360 who completed the survey, 14,540 completed cognitive assessments in mathematics and reading (for a 95 percent weighted response rate, based on survey participants). Their parents, teachers, principals, and librarians were surveyed as well.

First Follow-up Survey. In the spring of 2004, 14,710 of the originally selected sample members were reinterviewed (for a 95 percent weighted response rate). Some of the sample members were still in their base-year school while others had transferred to a new school or were not in school because they graduated early, dropped out, or were homeschooled. Similar to the base-year design, the first follow-up included a student questionnaire and cognitive test in mathematics. High school seniors in the base-year schools were typically surveyed and tested in group sessions at their schools. Seniors who had transferred to another school, dropped out, graduated, or entered a homeschooling situation were usually interviewed via telephone. Only students who remained in their base-year schools were administered the mathematics assessment. Test scores were imputed for transfer students.

Transcript Study Design. Starting in the winter of 2004–05, almost 1 year after most sample members had graduated from high school, transcripts were requested for all sample members who participated in at least one of the first two student interviews (base year or first follow-up). The sample included 16,370 students, of whom transcripts were obtained for 14,290 students, for a weighted response rate of 91 percent. Transcript data were inputted into a course-level file containing raw and standardized grades, length of course (e.g., year, semester, trimester), standardized Carnegie unit (i.e., credit), grade level at which course was taken, and a code for the course name (see Subject Area Classification, below).

Second Follow-up Survey. In the spring and summer of 2004, when most sample members were 2 years removed from high school graduation, a subsample of respondents was surveyed again. The questionnaire investigated postsecondary education, employment, and life experiences, and included gathering of detailed data on postsecondary institutions attended and specific months of enrollment and employment. In addition, administrative records from federal student financial aid databases and other sources were linked to individual sample members at the student level. To reduce respondent burden, certain questions in the ELS:2002 F2 questionnaire were routed to specific respondents; thus, some postsecondary employment information may be only available for those without postsecondary educational experiences.

A.3 Sampling, Response Weights, Weighting, and Analysis Samples Used in this Report

HS&B. This report uses questionnaire data collected in the HS&B first follow-up (1982) and second follow-up (1984) from the sophomore cohort originally surveyed in 1980. The base-year survey was conducted in the spring term of 1980. The study provided for a national probability sample of 1,015 secondary schools as the first units of selection. In the second stage, up to 36 seniors and 36 sophomores were selected in each school. Schools with high percentages of Hispanic students, Catholic schools with a high percentage of minority students, alternative public schools, and private schools with high-achieving students were oversampled. The unweighted response rate at the baseline school level was 70 percent and at the baseline student level was 85 percent for the sophomore cohort.[12] Case weights were adjusted for nonresponse. As noted above, high school transcripts were gathered for a subsample of the HS&B 1980 sophomore cohort (in 1982, when most were seniors). For the transcript subsample of about 18,400 sophomore cohort members, transcripts were received for 16,000, yielding an unweighted response rate of 87 percent. Among this 16,000, about 6,800 were regular or diploma graduates (within the specified dates; see glossary) from public schools, and the final analysis sample (excluding those without complete transcripts) included about 6,500 sample members.

NELS:88. NELS:88 differs from HS&B and ELS:2002 in that the first data collection phase began in the 8th grade rather than the sophomore or senior year; nonetheless, through a freshening procedure, NELS:88 generated nationally representative sophomore and senior cohorts as well. The data used in this report are from the second follow-up conducted in 1992 and the third follow-up conducted in 1994. The base-year (eighth-grade) cohort was drawn from a stratified national probability sample of 1,052 public and private eighth-grade schools from which about 25,000 students participated in the base-year study. The unweighted response rate at the baseline eighth-grade school level was 70 percent for the initial school selections. Replacement schools were used to achieve a realized sample of 815 public and 237 private schools. The eighth-grade student questionnaire completion rate was 93 percent. Two years later, most students had dispersed to new schools; 99 percent of these schools cooperated. The unweighted first follow-up (1990) student questionnaire completion rate was 94 percent (unweighted). The unweighted second follow-up (1992) student questionnaire completion rate was 93 percent. Transcripts were collected for a subsample of 19,320 sample members and obtained for about 17,300 of them (a coverage rate of over 89 percent). Case weights were adjusted for nonresponse. Among the transcript sample members, 12,600 attended public school in 12th grade. The graduating class sample used for the analyses in this report included a total of about 7,200 participants who graduated within the identified dates (see glossary) with a regular or honors diploma.

ELS:2002. The ELS:2002 base-year study was carried out in a national probability sample of 752 public, Catholic, and other private schools in the spring term of the 2001–02

[12] Weighted response rates for HS&B are not included in published documentation. Note that all four surveys have two-stage samples (the school is the primary sampling unit, and the student is the second stage sampling unit). In such a sample, the true response rate is the product of the response rates for the two levels (e.g., for HS&B seniors, 0.70 x 0.81 = 0.56.7, or 57 percent) (Seastrom 2003). However, bias analyses have also been conducted for school nonresponse for each of the surveys, to provide further information about possible bias in estimates (see, for example, Spencer et al. 1990).

school year. Of 17,591 eligible selected sophomores, 15,362 completed a base-year questionnaire. The unweighted response rate at the school level was 62 percent and at the sophomore baseline level student questionnaire completion was 87 percent. In the first follow-up (2004), 16,252 students participated, for an unweighted completion rate of 95 percent. Transcripts were requested for all sample members and obtained for about 91 percent of them (about 14,990 obtained of about 16,520 requested). Case weights were adjusted for nonresponse. This report uses data from the 2004 first follow-up (which includes the high school transcript data collection) and the 2006 second follow-up. Dropouts and others from the base-year sophomore cohort who did not progress on time to their senior year in 2004, and sample members who graduated early, are not included in the analyses conducted for this report. Out of approximately 12,000 F1 public school attendees in the ELS:2002, about 8,600 were regular or honors diploma recipients in the 2003–04 school year with complete transcript information.

Additional information about the design and conduct of HS&B, NELS:88, and ELS:2002 is provided in each study's user manuals and technical reports. For questionnaire-based comparisons in this report, the most relevant documents are the following: Jones et al. (1983); Ingels et al. (1994a, 1994b, 2005). For documentation of the high school transcript studies, see Jones et al. (1984) for HS&B, Ingels et al. (1995) for NELS:88, and, for ELS:2002, Bozick et al. (2006) (restricted documentation available only to NCES license holders) or Ingels et al. (2007) (public use documentation). For detailed reliability and validity information concerning the questionnaires and cognitive tests, the various psychometric and technical reports should also be consulted. On eligibility and exclusion, see Ingels (1996). For an analysis (using cross-cohort variables from HS&B, NELS:88 and ELS:2002) of the impact of imputation on estimates for 2002 relative to the unimputed estimates of 1980 and 1992, see Ingels et al. (2005), appendix C.

A.4 Description of Methods

A.4.1 Survey Standard Errors

Because the high school longitudinal studies' sample designs involved stratification (the disproportionate sampling of certain groups) and clustered probability sampling (selection of students within units such as schools), resulting statistics are more variable than they would have been if they had been based on data from a simple random sample of the same size.

Several procedures are available for calculating the exact standard errors of estimates in surveys with a complex sample design, where the sample is stratified, clustered, and statistically adjusted to compensate for nonresponse. Weights are provided with each of the studies used in this report so that procedures such as Taylor Series approximations, Balanced Repeated Replication (BRR), and Jackknife Repeated Replication (JRR) can be used to estimate correct, design-adjusted standard errors. Advanced statistical programs such as SUDAAN, AM, or Stata produce similar results. The analyses included in this report used Balanced Repeated Replication (BRR) methods to calculate standard errors. This procedure involves creating multiple sets of estimation results based on replicate weights and utilizing the results to estimate a single standard error for the mean, proportion, or regression coefficient.

A.4.2 Statistical Testing

The statistical comparisons in this report were based on the *t* statistic. Whether the difference between two groups is considered statistically significant is determined by calculating a *t* value for the difference between a pair of means or proportions and comparing this value to published tables of values, called critical values (cv). The alpha level is an a priori statement of the probability that a difference exists in fact rather than by chance. Analyses in this report use an alpha level of 0.05. No adjustments for multiple comparisons were used.

The *t* statistic between estimates from various subgroups presented in the tables can be computed by using the following formula:

$$t = \frac{x_1 - x_2}{\sqrt{\left(SE_1^2 + SE_2^2\right)}}$$

where x_1 and x_2 are the estimates to be compared (e.g., the weighted means of observed sample members' values in two groups), and SE_1 and SE_2 are their corresponding standard errors. This formula is valid only for independent estimates. When the estimates are not independent (a handful of comparisons in this report are based on dependent estimates), a covariance term was added to the denominator of the formula. For tests comparing correlated samples, the *t* statistic is:

$$t = \frac{E_1 - E_2}{\sqrt{se_1^2 + se_2^2 - 2(r)se_1se_2}}$$

where E_1 and E_2 are the estimates to be compared, se_1 and se_2 are the corresponding standard errors, and *r* is the correlation between the observed values of two variables. For either independent or dependent comparisons, adjustments (i.e., Bonferroni) for multiple comparisons (which increase the likelihood of a false positive, i.e. a statistically significant difference when, in fact, there is not one) were not conducted.

A.4.3 Ordinary Least Squares Regression

Analysis conducted in chapter 4 uses ordinary least squares (OLS) regression techniques to analyze the relationship between academic coursetaking and CTE coursetaking. In OLS regression, the statistical relationship between an outcome or dependent variable and one or more predictor or independent variables is estimated as a sloped line representing how much the outcome variable changes for each change in the predictor variables. The overall regression line has a beginning value (called an intercept, or constant) and one or more values (called coefficients) indicating how much the outcome increases or decreases per each unit change in the predictor variable(s). A positive coefficient represents an increase in the outcome variable for every 1 unit increase in the predictor variable; a negative coefficient represents a decrease in the same unites. The size of that increase is indicated by the size of the coefficient itself.

This overall regression line represents the average relationship across all cases in the analysis. Differences between the average line and the actual value for a case are called residuals

or errors, and cumulatively help provide measures of the "fit" or predictive power of the predictor variable(s) on the outcome variable.

In symbolic terms, an OLS regression equation for a bivariate relationship is:

$$Y_i = \beta_0 + \beta_1 X_i + r_i$$

where Y_i is the outcome value for case i, β_0 represents the intercept, X_i is the predictor value for case i and β_1 is its associated coefficient, and r_i is the error (residual) term. The OLS procedure estimates these true values for the population and generates a measure of statistical imprecision (the standard error) which is used to test the statistical significance of the intercept and each coefficient. Also, it is assumed that r_i is normally distributed with a mean of zero and a given variance; this assumption implies that there are no missing predictors that may bias the estimate of the coefficient(s).

In the analyses presented in the text, only bivariate OLS regression is used. There may be other predictors which affect the outcome (CTE or occupational credits earned) and which, by not including in the model, bias the estimate for the academic credit effect or explain it entirely. In addition, because students are organized into classrooms and schools, this regression approach does not take into account correlations among students who are probably similar within classrooms and schools; these correlations may affect the results as well. The results for the chapter 4 OLS regression analyses should therefore be interpreted with caution.

A.4.4 Effect Sizes

In chapter 5, effect sizes are presented that provide a standardized metric for cross-cohort differences in mathematics achievement. Effect size is a measure that standardizes differences so that they are comparable across studies and can be judged in the context of other research findings (Cohen 1988). To standardize the raw differences, they are divided by a measure of the variation in scores, usually a standard deviation. In this case, pooled standard deviations across 1992 and 2004 graduates are used. The pooled standard deviation is:

$$\sigma_p = \sqrt{[(\sigma_1^2 + \sigma_2^2) / 2]}$$

Where σ_1 and σ_2 are the standard deviations of groups 1 and 2 (in the current report, the 1992 and 2004 cohorts), respectively. Effect size is then calculated as:

$$d = (M_1 - M_2) / \sigma_p$$

where M_1 and M_2 are the means of the respective groups (the 1992 and 2004 cohorts). The result of this formula is an indication of how much scores differ relative to the range of scores found for the original metric.

Cohen (1988) provides guidelines for the magnitude of effect sizes, with 0.20 representing small effect sizes, 0.50 representing medium effect sizes, and 0.80 representing large effect sizes. In the context of secondary schooling, however, these guidelines are likely too large. For example, the average annual math gain effect size from grade 10 to 12 on a series of nationally standardized tests was reported as 0.075 (Bloom et al. 2008—this is calculated as the

average of the grades 10–11 effect size of 0.15 and the grades 11–12 effect size of 0.01, p. 16). Calculations performed with ELS:2002 math scores suggest that the average annual gain across these two grades is larger, at about 0.17. However, this is still smaller than the Cohen "small" effect size. In the present discussion, reported effect sizes are not explicitly identified as large, medium, or small, but an appropriate benchmark for comparison is the 0.17 annual growth effect size from ELS:2002 math data. The annual growth effect size metric is a logical benchmark for growth or differences in achievement scores, and individual effect sizes in the text can be interpreted as proportions of the typical annual growth in mathematics. However, it should be noted that the field of effect size research in education contains a variety of alternative effect size formulas and interpretive approaches that may be appropriate.

A.5 Bias Analysis

A bias analysis was conducted to assess whether the ELS:2002 analytic sample for the occupational expectations analysis in chapter 7 was similar to the group of ELS:2002 respondents who replied "don't know" to the question about occupational expectations. Unlike in HS&B and NELS:88 questionnaires, ELS:2002 respondents provided verbatim responses to the question, "Write in the name of the job or occupation you expect or plan to have at age 30." Among the written responses were a relatively high proportion of "don't know" (or similar) answers, which were coded as such: 29 percent of the weighted sample providing answers to this question wrote "don't know." Table A-1 shows the weighted percentages of select student characteristics used in this study for two samples: the analytical sample reflected in table 24 (i.e., with graduates with the "don't know" response excluded), and the sample of graduates that includes those with "don't know" responses. This comparison shows whether the results presented in table 24 generalize to all graduates who provided responses or reflects a different group.

Table A-1. Percentage of public high school graduate sample with specific occupational expectations for age 30 versus the same sample with "don't know" responses included, by student characteristics: 2004

Characteristic	Sample excluding "don't know" responses	Sample including "don't know" responses
Total		
Specific occupational expectations	100.0	71.2
Don't know	†	28.8
Sex		
Male	48.0	48.2
Female	52.0	51.8
Race/ethnicity[1]		
Asian/Pacific Islander	3.8	4.4
Black	14.7	12.5
Hispanic	15.5	14.5
White	61.2	63.7
Other	4.9	4.8
Socioeconomic status		
Lowest quartile	23.6	22.2
Middle 2 quartiles	50.5	51.6
Highest quartile	25.9	26.2
Future goals		
Expects at least a bachelor's degree	75.8	77.3
Finding steady work is very important	88.9	88.0
Math achievement		
Estimated number-right score (mean)	50.7	50.9
Level 1 proficiency	96.8	96.7
Level 2 proficiency	79.8	80.1
Level 3 proficiency	63.3	64.2
Level 4 proficiency	35.4	36.1
Level 5 proficiency	3.9	3.9

† Not applicable

[1] Asian/Pacific Islander includes Native Hawaiian. Hispanic may be of any race. "Other" category refers to those answering "other" in 1982 and 1992 and those answering more than one race in 2004.

N = 5,900 for excluded "don't know" sample; N = 8,300 for included "don't know" sample.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

All but one of the comparisons between the excluded "don't know" sample and the included "don't know" sample are not statistically significant. The statistically significant difference is that the "don't know"-excluded sample (reported in table 24) has a slightly greater proportion of Black sample members than the "don't know"-included sample (15 percent versus 13 percent). In terms of sex, non-Black race/ethnicity, socioeconomic status, future goals, and

mathematics performance, there are no detectable differences between the two samples. The conclusion is that the results from table 24 fairly represent the overall sample of graduates, despite 29 percent of respondents being excluded for indicating "don't know."

A.6 Glossary of Variables

This glossary gives the definitions of each analysis variable used in the main text and the specific variable names from each study. Variables used in other appendices are described there. The glossary is organized by chapters of the main text. Additional tables of results are presented when alternative variables are available; standard errors for these tables may be found at the end of appendix B.

Chapter 2. Data and Methods

Sample definition. Sample members were included in the analysis if they were public high school students at the time of the senior-year follow-up of each study, had earned a regular or honors diploma, had graduated between September prior to the senior-year follow-up and October of the senior-year follow-up, had earned at least 16 total Carnegie credits (a standardized measure of credits equal to 1 hour's worth of coursetaking a day for one school year), and had earned at least some credits in English. Sample members who had dropped out, were early graduates, were being homeschooled, or did not complete questionnaires are not included in the analysis samples.

Public high school student

HS&B: SCHSAMP = 0, 1, 2, or 3

NELS:88: F2SCHTYP = 1

ELS:2002: F1RSLCTR = 1 (last school listed on transcript files = public). If F1RSLCTR is missing, then public school students were identified by BYSCTRL = 1 (if F1QSTAT ~= 0, 5, or 7).

Regular or honors diploma graduate

HS&B: RESNLEFT = 1 and ENROLLED = 2, 3, 5, or 6

NELS:88: F4HSTYPE = 1 and F2RREASL = 1 or 2

ELS:2002: F1RTROUT = 1

At least 16 total credits (in Carnegie units and derived from transcripts)

HS&B: RTOT >= 16

NELS:88: RTOT >= 16

ELS:2002: F1RHTUN >= 16

Graduation date (inclusive of beginning and ending months)

HS&B: 9/1981 to 8/1982 per YEARLEFT and MONLEFT

NELS:88: 9/1991 to 8/1992 per F3HSCPDT and F3HSCPDT (F3HSCPDT <= 9208 and F3HSCPDT ~= 9200)

ELS:2002: 9/2003 to 8/2004 per F1RTROUT

English credits > 0

HS&B: RI3 >0

NELS:88: ENG > 0

ELS:2002: F1RENG_C > 0

Weighting and variance estimation. Weights were senior-year follow-up transcript weights for all chapters; chapter 7 also used 2 years after senior year follow-up transcript weights. Balanced repeated replication methods were used for estimating standard errors. BRR weights were not originally included on HS&B, NELS:88, and ELS:2002 data releases, but were provided later by NCES.

Weights

HS&B: WTK000

NELS:88: WTP000

ELS:2002: F1TRSCWT and F2TRSCWT

Balanced repeated replicate weights

HS&B: WTK001 to WTK092

NELS:88: WTP001 to WTP040

ELS:2002: F1TRS1 to F1TRS200, and F2TRS1 to F2TRS200

3. Participation in Career and Technical Education

Total credits earned. All courses are divided into one of three categories: academic, career and technical education (CTE), or enrichment/other. The total number of earned credits is a sum of courses across all three areas, and were specially created for this study based on all courses listed in appendix D. Note that credits that appear on transcripts but were identified as having been taken in the seventh or eighth grade, or were ungraded, are not included in any sums of credits earned. However, courses that were identified by title as grade 8 or grade 7 courses, but were taken in grades 9 through 12, were included in these sums.

Total academic credits earned. Academic courses were specifically identified for this report and summed to create total academic credits earned. Academic courses are listed in appendix D.

Credits earned in English, mathematics, science, social studies, fine arts, and non-English (foreign) language. These are separate tallies of subject area credit totals. Courses counting toward the credit sums in each of these subjects are listed in appendix D.

Total CTE credits earned. These are based on a sum of general labor market preparation (GLMP), family and consumer sciences education (FCSE), and occupational area courses specifically created for this report and are based on courses listed under those categories in appendix D.

Total occupational area credits earned. This is based on a sum of credits across all 11 occupational area courses described above under "2. Data and methods." This was specifically created for this report and is based on courses listed under "occupational areas" in appendix D.

Total enrichment/other courses. These include nonacademic and non-CTE courses, summed. The courses in this category are listed in appendix D.

Percent occupational credits earned. Percent occupational credits earned = (total credits earned/total occupational credits earned) x 100.

Number of occupational areas in which credit was received. If a sample member earned 1 credit or more in a given occupational area, that occupational area counted toward the total number of occupational areas in which credit was received.

Academic orientation. Sample members were classified into "academic focus" and "general education focus" groups. Classification of Secondary School Courses (CSSC) codes were taken from the course-level transcript files of each of the respective studies. Academic focus was defined on the basis of the credit minima listed below. Those not meeting these credit requirements were categorized as general education focus by default. See appendix D for specific courses counting toward each subject area.

English: 4 credits
Mathematics: 3 credits
Science: 3 credits
Social studies: 3 credits

Career and Technical Education (CTE). Courses were classified as CTE courses based on a recent revision to the CTE taxonomy of the Secondary School Taxonomy (SST) (Bradby and Hudson 2008). CTE courses are grouped into the categories of general labor market preparation (GLMP), family and consumer sciences education (FCSE), and specific labor market preparation (SLMP, but referred to as occupational area courses in the main text). "Total" or "overall" CTE courses or credits referenced in the main text are the sum of courses in all three of these categories. See appendix D for specific courses falling into each category.

Occupational investment. Sample members were classified into one of four categories. The four categories were divided into two broad groups of two categories each:

A. Noninvestor
   5. Nonparticipant: less than 1 total occupational credits earned
   6. Sampler: 1 to fewer than 3 total occupational credits

B. Investor
   7. Explorer: 3 or more total occupational credits, but no single occupational area with 3 or more credits
   8. Concentrator: 3 or more total occupational credits in at least one area (i.e., may earn 3 or more credits in more than just one occupational area)

Classification into these groups was based on only the CTE courses identified as occupational area courses (i.e., specific labor market preparation courses). Occupational area courses were placed into the 11 categories listed below. These categories reflect a "career cluster" organization of occupational area courses, which is closely tied to postsecondary employment and education classification schemes (Bradby and Hudson 2008; Hudson and Laird 2009). The 11 occupational areas are

1. Agriculture and Natural Resources;
2. Architecture, Construction, and Science Technology;
3. Business;
4. Communications and Design;
5. Computer and Information Science;
6. Consumer and Culinary Services;
7. Engineering Technologies;
8. Health Sciences;
9. Manufacturing, Repair, and Transportation;
10. Marketing; and
11. Public Services.

Alternative occupational area classifications exist. For example, there is a 21-area occupational grouping available discussed in Bradby and Hudson (2008); this is the most specific classification currently published. To determine if groupings of occupational areas influenced the distribution of occupational concentration (e.g., if more areas made it more difficult for a student to be classified as a concentrator, under the theory that the same number of courses would be spread across additional areas), a percentage distribution of highest number of occupational credits in one area was produced for both the 11-area classification and the 21-area classification for the ELS:2002 sample members. The 21-area classification applied to the ELS:2002 transcript data is, in practice, 20 areas; one coursetaking area was not represented on any student's transcript. The percentage distributions are presented in table A-2.

Table A-2. Percentage of public high school graduates by highest level of credits (Carnegie units) earned in any one occupational area, for two groupings of occupational areas: 2004

	Number of occupational areas	
Highest number of credits earned in 1 area	11 areas	21 areas
0	11.4	11.4
less than 1	14.4	15.1
1	38.8	41.1
2	18.2	17.4
3	8.7	7.3
4	4.0	3.7
5 or more	4.4	3.9

NOTE: A Carnegie unit is equivalent to a course taken for one period each day for one full school year. Credit categories are divided by the credit indicated up to (but not including) the next credit: for example, 1 credit to less than 2 credits, 2 credits to less than 3 credits, etc.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

There are approximately 2.3 percentage points fewer occupational concentrators (3 or more credits in one area) under the 21-area classification than the 11-area classification. Correspondingly, there are 3.1 percentage points more graduates earning 1 credit in any given area under the 21-area classification than the 11-area classification. However, there is a 0.8 percentage point fewer graduates earning exactly 2 credits in one area in the 21- versus 11-area classification. (All individual concentration levels represented by the rows are statistically significantly different across classifications, except for 0 credits, which does not change across classifications.) This suggests that results presented in the main report may be slightly different depending on the 21-area classification. However, given that this represents nearly a doubling of the number of areas, the effect may be considered substantively small. Fully 86 percent of those classified as concentrators under the 11-area classification would be so classified under the 21-area classification, and a majority of the remaining 13 percent would likely be classified as "explorers" according to the exhaustive categories defined above, thereby keeping them defined as occupational "investors" in either schema.

Another alternative to the occupational investment categorization employed in this report would use a continuous measure of occupational credits earned only. Further analysis shows how students classified under such a continuous measure fall within a concentration-based measure such as used to inform the occupational investment variable. Tables A-3 through A-5 present the percentage distribution of public school graduates by total occupational credits earned (a categorization of a continuous measure) and highest number of credits earned in one occupational area (a categorization of concentration) for each of the three cohorts studied in this report. The results show that substantial percentages of graduates who earn 4 or even 5 total occupational credits did not concentrate their studies (and that this percentage grew over time); that is, that a purely continuous measure would not substitute for a measure that includes a concentration measure, assuming the analytic utility of the latter. Additional research would be required to distinguish whether graduates at the same level of total occupational credits but with or without an occupational concentration have different or similar outcomes.

Table A-3. Percentage of public high school graduates at the highest number of credits (Carnegie units) earned in any one occupational area, by total occupational credits earned: 1982

	Highest number of credits earned in one occupational area							
Total occupational credits	0	<1	1	2	3	4	5 or more	Row total
0	11.1	†	†	†	†	†	†	11.1
less than 1	†	7.3	†	†	†	†	†	7.3
1	†	3.3	15.1	†	†	†	†	18.4
2	†	0.3	9.5	7.4	†	†	†	17.2
3	†	‡	3.4	6.5	4.1	†	†	14.1
4	†	#	0.7	3.5	2.9	3.0	†	10.0
5	†	#	0.2	1.4	1.9	2.0	1.7	7.1
6	†	#	#	0.6	1.0	1.1	3.2	5.9
7	†	#	#	#	0.8	0.8	2.8	4.5
8 or more	†	#	#	0.1	0.1	0.4	3.9	4.4
Column total	11.1	10.9	28.9	19.4	11.0	7.3	11.5	100.0

Rounds to zero

† Not applicable

‡ Reporting standards not met

NOTE: A Carnegie unit is equivalent to a course taken for one period each day for one full school year. Credit categories are divided by the credit indicated up to (but not including) the next credit: for example, 1 credit to less than 2 credits, 2 credits to less than 3 credits, etc.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study."

Table A-4. Percentage of public high school graduates at the highest number of credits (Carnegie units) earned in any one occupational area, by total occupational credits earned: 1992

	Highest number of credits earned in one occupational area							
Total occupational credits	0	<1	1	2	3	4	5 or more	Row total
0	14.3	†	†	†	†	†	†	14.3
less than 1	†	8.6	†	†	†	†	†	8.6
1	†	4.2	20.0	†	†	†	†	24.2
2	†	0.1	11.2	6.3	†	†	†	17.6
3	†	‡	4.4	5.7	3.4	†	†	13.5
4	†	#	0.8	2.8	2.8	1.8	†	8.3
5	†	#	0.2	1.1	1.8	1.3	0.8	5.1
6	†	#	‡	0.4	0.9	0.8	1.5	3.7
7	†	#	#	‡	0.3	0.5	1.3	2.2
8 or more	†	#	#	#	0.1	0.2	2.3	2.6
Column total	14.3	12.9	36.6	16.3	9.2	4.7	5.9	100.0

Rounds to zero

† Not applicable

‡ Reporting standards not met

NOTE: A Carnegie unit is equivalent to a course taken for one period each day for one full school year. Credit categories are divided by the credit indicated up to (but not including) the next credit: for example, 1 credit to less than 2 credits, 2 credits to less than 3 credits, etc.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992."

Table A-5. Percentage of public high school graduates at the highest number of credits (Carnegie units) earned in any one occupational area, by total occupational credits earned: 2004

	Highest number of credits earned in one occupational area							
Total occupational credits	0	<1	1	2	3	4	5 or more	Row total
0	11.2	†	†	†	†	†	†	11.2
less than 1	†	8.1	†	†	†	†	†	8.1
1	†	4.9	17.8	†	†	†	†	22.7
2	†	0.5	14.2	5.0	†	†	†	19.6
3	†	‡	5.6	6.3	2.4	†	†	14.3
4	†	#	1.7	4.0	2.5	1.1	†	9.3
5	†	#	0.2	2.0	1.9	1.3	0.3	5.7
6	†	#	0.1	0.8	1.1	0.7	1.0	3.8
7	†	#	‡	0.3	0.4	0.5	1.0	2.1
8 or more	†	#	#	0.1	0.4	0.6	2.2	3.3
Column total	11.2	13.5	39.6	18.5	8.7	4.2	4.4	100.0

Rounds to zero

† Not applicable

‡ Reporting standards not met

NOTE: A Carnegie unit is equivalent to a course taken for one period each day for one full school year. Credit categories are divided by the credit indicated up to (but not including) the next credit: for example, 1 credit to less than 2 credits, 2 credits to less than 3 credits, etc.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Sex. Sex or gender of sample member, reported by the respondent. In NELS:88 and ELS:2002, name was used to impute sex in the rare cases this information was not supplied in the base year by the respondents. Non-first follow-up versions were used when these included updates to first follow-up participants' missing responses.

HS&B: SEX

NELS:88: F3SEX

ELS:2002: F2SEX

Race/ethnicity. Sample members are divided into one of five racial or ethnic categories: Asian/Pacific Islander (including Native Hawaiian), Black, Hispanic, White, or Other. Hispanic may be of any race; all race categories are implicitly non-Hispanic. Because of small percentages that result in unstable estimates, results for American Indians are not reported. HS&B and NELS:88 explicitly allowed for "other" responses, and ELS:2002 allowed for respondents to choose more than one race; both of these categories are reported as "Other" in the tables. Non-first follow-up versions were used where these included updates to first follow-up participants' missing responses.

HS&B: RACE

NELS:88: F3RACE

ELS:2002: F1RACE_R

Socioeconomic status (SES). The SES quartile variable used in this report is based on a continuous SES index variable. The continuous SES index is derived from five equally weighted and standardized component scores: mother's occupational prestige, father's occupational prestige, mother's education, father's education, and family income. The use of these components differed somewhat across studies. Only father's occupational prestige is used in HS&B (even if missing, mother's occupational prestige is not used, and the SES index is based on the remaining items). Family income was not available in HS&B, and a sum of household possessions was used as a proxy; in NELS:88, family income was used, but a sum of household possessions was used if family income was missing; in ELS:2002, only family income was used. Finally, in HS&B, student responses served as the source of information; in NELS:88 and ELS:2002, parent data were typically used, and student data used to supplement missing parent information. Further information about the components and differences across studies can be found in the technical reports for each of the studies, specifically Jones et al. (1983) for HS&B, Ingels et al. (1994a) for NELS:88, and Ingels et al. (2007) for ELS:2002. A discussion of SES index construction differences across studies can be found in Ingels and Dalton (2008), appendix A.

SES quarter indicates the part of the population distribution of the SES index to which a student belongs: the bottom 25 percent (below the 25th percentile score cutpoint), the middle 25–75 percent (between the 25th and 75th percentile), or the top 25 percent (above the 75th percentile).

HS&B: BYSESQ

NELS:88: F2SES1

ELS:2002: BYSES1QU

School size. Size of the student's senior-year school is divided into small (fewer than 1,000 students), medium (1,000–1,999 students), and large (more than 2,000 students). These variables were based on school size information from sampling data (not administrator or student reports).

HS&B: SB002A

NELS:88: F2SCENRL

ELS:2002: CP04STEN

School urbanicity. The urbanicity of the student's senior-year school's locale, divided into rural, suburban, and urban. This is based on sampling data or other third-party data (not administrator or student reports).

HS&B: SCHURB

NELS:88: G12URBAN3

ELS:2002: F1RSLURB

4. Academic and Occupational Coursetaking

Credits earned in academic subjects. See above under "3. Participation in Career and Technical Education." Courses counting toward each subject area are listed in appendix D.

Highest mathematics course taken. This variable is based on the "pipeline" variables first published in Burkam and Lee (2003) and provided with the ELS:2002 data (F1RMAPIP). The HS&B and NELS:88 versions were specially created for this report. This reports the highest level of math in which credit was earned, regardless of what grade it was taken in. Math coursetaking is divided into five categories: no math (zero credits) or low academic math; algebra I or plane geometry, algebra II; algebra III, trigonometry, or analytic geometry; and precalculus or calculus. See appendix D for specific CSSC codes and course titles counting toward each level.

Highest science course taken. This variable is based on the "pipeline" variables first published in Burkam and Lee (2003) and provided with the ELS:2002 data (F1RSCPIP). The HS&B and NELS:88 versions were specially created for this report. This reports the highest level of science in which credit was earned, regardless of what grade it was taken in. Science coursetaking is divided into four categories: no science (zero credits) or low level science; secondary physical science or basic biology; general biology; and advanced biology, chemistry, or physics. See appendix D for specific CSSC codes and course titles counting toward each level.

Four-year college preparation. Sample members are classified as meeting or not meeting the following earned credits criteria:

English: 4 credits

Mathematics: 3 credits at the level of algebra 1 or higher

Biology: 2 credits in biology, chemistry, and/or physics

Social studies: 2 credits with at least one in U.S. or world history

Non-English (foreign) language: 2 credits in one non-English language

Most common CTE and occupational area courses taken. These are defined as described above under "2. Data and methods." Course titles listed in the tables reflect shortened CSSC-standardized titles and not necessarily actual course titles on transcripts. See appendix D for listing of courses under each specific CTE or occupational area category.

Total academic, mathematics, and science credits, and math credits at level of algebra II or higher. The total credits variables used in tables 15 and 16 are the same as reported elsewhere, except for math. Math credits at the level of algebra II or higher include courses beginning with algebra II and after in the math credits section of appendix D.

5. Math Achievement

Number-right math score. Overall mathematics assessment scores are represented as item response theory (IRT)-estimated number-right scores. These are based on a math test explicitly created for the secondary longitudinal studies. Because students did not take every item in the pool of math test items, an estimated number-right score was created using IRT scaling procedures; this score represents what the student would be predicted to score had he or she taken all 81 items in the original NELS:88 math test item pool. Therefore, scores range from 0 to 81. Further information on test design, IRT, and equating across ELS:2002 and NELS:88 is provided below.

NELS:88: F12XMIRR

ELS:2002: F1NELS2M

Probability of math proficiency. Although not presented in the main text because of its difficulty of summarizing, we present results for a more detailed mathematics outcome by occupational coursetaking category and academic orientation. These probability of proficiency scores estimate the probability that a given student would have demonstrated proficiency for each of the five mathematics levels defined for the NELS:88 survey in 1992 (Rock and Pollack 1995). The five proficiency levels represent progressively more difficult and complex mathematical skills and knowledge; mastery of a higher level implies mastery of a lower level. The following provides a description of the five proficiency levels:

1. simple arithmetical operations on whole numbers, such as expressions involving multiplication or division of integers;
2. simple operations with decimals, fractions, powers, and roots, such as comparing expressions, given information about exponents;
3. simple problem solving, requiring the understanding of low-level mathematical concepts, such as simplifying an algebraic expression or comparing the length of line segments illustrated in a diagram;
4. understanding of intermediate-level mathematical concepts and/or multistep solutions to word problems such as drawing an inference based on an algebraic expression or inequality; and
5. complex multistep word problems and/or advanced mathematics material such as a two-step problem requiring evaluation of functions.

The mean of a proficiency probability score aggregated over a subgroup of students is analogous to an estimate of the percentage of students in the subgroup who have displayed mastery of the particular skill.

NELS:88: F12XMPP1 to F12XMPP5

ELS:2002: F1TX1MPP to F1TX5MPP

Table A-6 provides results for the proficiency probability scores.

Table A-6. Probability of mathematics proficiency and standardized mean difference (effect size) for 1992 to 2004 change in probabilities of public high school graduates, by occupational coursetaking category: 1992 and 2004

Occupational coursetaking category and level of math proficiency	1992	2004	Difference 2004-1992	Effect size
Total				
Level 1	0.95	0.94	-0.010	-0.07
Level 2	0.76	0.79	0.037	0.12
Level 3	0.59	0.63	0.041	0.11
Level 4	0.35	0.36	0.008	0.02
Level 5	0.04	0.04	-0.002	-0.01
Occupational coursetaking category				
Occupational noninvestor				
Nonparticipant				
Level 1	0.97	0.96	-0.010	-0.07
Level 2	0.85	0.83	-0.016	-0.05
Level 3	0.74	0.72	-0.020	-0.06
Level 4	0.49	0.47	-0.021	-0.06
Level 5	0.06	0.06	0.007	0.03
Sampler				
Level 1	0.95	0.97	0.014	0.09
Level 2	0.77	0.81	0.034	0.11
Level 3	0.61	0.65	0.040	0.11
Level 4	0.37	0.37	0.005	0.01
Level 5	0.05	0.04	-0.010	-0.06
Occupational investor				
Explorer				
Level 1	0.95	0.96	0.014	0.09
Level 2	0.71	0.78	0.073	0.23
Level 3	0.51	0.60	0.096	0.26
Level 4	0.25	0.30	0.056	0.17
Level 5	0.02	0.03	0.004	0.03
Concentrator				
Level 1	0.92	0.96	0.035	0.21
Level 2	0.65	0.73	0.081	0.24
Level 3	0.45	0.54	0.084	0.22
Level 4	0.22	0.25	0.036	0.11
Level 5	0.01	0.02	0.008	0.07

NOTE: Nonparticipants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Further information on the mathematics assessments.

Test Design and Format. Test specifications for the ELS:2002 assessments were adapted from frameworks used for NELS:88. The framework had two levels: content areas and cognitive processes. Content areas included arithmetic, algebra, geometry, data/probability, and advanced topics. Cognitive process areas included skill/knowledge, understanding/comprehension, and problem solving. The NELS:88 and ELS:2002 assessments were designed to maximize the accuracy of measurement that could be achieved in a limited amount of testing time while minimizing floor and ceiling effects, by matching sets of test questions to initial estimates of students' achievement from a routing test. Most test items in NELS:88 and ELS:2002 had multiple choice response options.

Item Response Theory. The scores used to describe students' performance on the direct cognitive assessment are broad-based measures that report performance as a whole. The scores are based on item response theory (IRT), which uses patterns of correct, incorrect, and omitted answers to obtain ability estimates that are comparable across different test forms (Embretson and Reise 2000; Hambleton, Swaminathan, and Rogers 1991). In estimating a student's ability, IRT also accounts for each test question's difficulty, discriminating ability, and a guessing factor.

IRT has several advantages over raw number-right scoring. By using the overall pattern of right and wrong responses to estimate ability, IRT can compensate for the possibility of a low-ability student guessing several difficult items correctly. If answers on several easy items are wrong, a correct difficult item is assumed, in effect, to have been guessed. Omitted items are also less likely to cause distortion of scores, as long as enough items have been answered right and wrong to establish a consistent pattern. Unlike raw number-right scoring, which necessarily treats omitted items as if they had been answered incorrectly, IRT procedures use the pattern of responses to estimate the probability of correct responses for all test questions. Finally, IRT scoring makes it possible to compare scores obtained from test forms of different difficulty. The common items present in overlapping forms and in overlapping administrations (10th grade and 12th grade) allow test scores to be placed on the same scale.

ELS:2002-NELS:88 Equating. Equating the ELS:2002 scale scores to the NELS:88 scale scores was completed through common-item or *anchor equating*. The ELS:2002 and NELS:88 mathematics tests shared 44 mathematics items. These common items provided the link that made it possible to obtain ELS:2002 student ability estimates on the NELS:88 ability scale.

6. Postsecondary Education

Educational expectations. All three studies asked (in slightly variant ways) about sample members' expectations for future educational attainment. For this report, the original categories were collapsed into four: high school or less, some college (short of a bachelor's degree), bachelor's degree, and graduate or professional degree. In ELS:2002 (but not HS&B or NELS:88) missing educational expectations data were statistically imputed.

HS&B: PPSEPLAN

NELS:88: F2S43

ELS:2002: F1S42

Ever enrolled in postsecondary institution. These are student-reported results. The ELS:2002 version of this variable is imputed for missing cases.

HS&B: SY15

NELS:88: F3PSENUM

ELS:2002: F2EVRATT

Enrollment intensity at first postsecondary institution. This variable only applies to those sample members with at least some postsecondary enrollment. Respondents were asked to report whether they attended part-time or full-time for either one specific enrollment period (HS&B) or for specific enrollment periods (month-by-month) (NELS:88 and ELS:2002). In HS&B, this variable refers to the last month of enrollment at the first postsecondary institution. In NELS:88 and ELS:2002, the variables are based on full enrollment histories. In ELS:2002, if "equal mix" of part-time and full-time was recorded, respondents were assigned "part-time" status.

HS&B: SY18F

NELS:88: PSEFIRST

ELS:2002: F2PS1FTP

Level of first postsecondary institution. This variable only applies to those sample members with at least some postsecondary enrollment. Level of the first postsecondary institution attended is categorized as 4-year, 2-year, or less than 2-year.

HS&B: SY18A

NELS:88: REFTYPE

ELS:2002: F2PS1LVL

Postsecondary enrollment pattern. This variable only applies to those sample members with at least some postsecondary enrollment. This variable combines enrollment status in the period immediately after high school graduation (categorized as immediate or delayed) and enrollment status reported 2 years after high school graduation (categorized as enrolled or not enrolled any time during the follow-up survey year, i.e., through August). Immediate enrollment as used in this report refers to postsecondary attendance which began by the fall of the graduation year (if the graduation date was in the spring), or by the following spring (if the high school graduation date was in the fall); delayed enrollment describes postsecondary attendance which does not meet the criteria for immediate enrollment. Enrollment 2 years later is defined by whether the respondent was enrolled in a postsecondary school at any point in 1984 (for HS&B respondents), 1994 (for NELS respondents), or 2006 (for ELS respondents).

HS&B: Calculated for report

NELS:88: Calculated for report using NUMINST, HSSTAT, YRRECM, YRRECY, NUMINST, STRTYR1, STRTMON1, and ENRL0194 through ENRL0894

ELS:2002: F2RTYPE

7. Postsecondary Employment

Occupational expectations. Sample members were asked what occupation they expected to have at age 30. HS&B and NELS:88 respondents were provided with job categories based on 1970 Census occupation categories. ELS:2002 respondents gave occupation titles directly, and these were subsequently coded into the HS&B and NELS:88 job categories. Further, HS&B did not provide an "other" category, and ELS:2002 provided a "don't know" option for respondents. Because the proportion of respondents in ELS:2002 who answered "don't know" was high (above a quarter of respondents), a bias analysis was conducted to compared the "don't know" respondents to other respondents; the results from this analysis are reported in section A.5 of this appendix.

The occupational categories were clerical, craftsmen, farmer, homemaker, laborer, manager, military, operative, professional, proprietor, protective services, sales, service, technical, and other.

HS&B: FY77A

NELS:88: F2S64B, combining code 9 (professional A), 10 (professional B) and 14 (school teacher) into a single category for professional jobs

ELS:2002 F1S57, verbatim coded to the HS&B/NELS:88 categories

Work goals identified as very important. Respondents addressed the following work goals (among other life values questions) in answering the question, "How important is each of the following to you in your life?" Response options were "not important," "somewhat important," and "very important."

Variables:	HS&B	NELS:88	ELS:2002
Being successful in my line of work	FY73A	F2S40A	F1S40A
Having lots of money	FY73C	F2S40C	F1S40C
Being able to find steady work	FY73E	F2S40E	F1S40E

Weekly hours spent working during senior year. This information is available for NELS:88 and ELS:2002. Weekly hours working for pay was not available in HS&B. Responses were categorized into the following: did not work; 1–15 hours; and 16 or more hours.

HS&B: Not applicable

NELS:88: F2S88

ELS:2002: F1S60

Ever employed by 2 years after graduation. This variable applies to all sample members, regardless of postsecondary education enrollment. This variable indicates whether the respondent ever worked for pay at the time of the 2-year postgraduation survey. ELS:2002 missing data are imputed.

HS&B: SY45

NELS:88: LABR0792 through LABR0294

ELS:2002: F2EVRJOB

Number of months employed in first 2 years after graduation. This variable only applies to sample members who had no postsecondary education enrollment; it was not asked of postsecondary enrollees. This variable refers to the sum of months which the respondent indicated they were employed (either full- or part-time) between September of the graduating year (1982 for HS&B, 1992 for NELS:88, and 2004 for ELS:2002) through February 2 calendar years later (1984, 1994, and 2006), inclusive. Range is 0 to 18 months. HS&B asked about the month and year the respondent started and ended each of up to four jobs after high school; the number of months employed therefore is undercounted for a small fraction of respondents who held five or more jobs during this period. In contrast, NELS:88 and ELS:2002 both asked about employment status for each month between the graduation year and the post-graduation follow-up, regardless of number of jobs.

HS&B:	Calculated from SY46 through SY49 (sub-items EM, EY, F, FM, and FY of each) for respondents for whom SY45 ("held any job between high school and February 1984") = 1 ("Yes").
NELS:88:	Calculated from month-by-month employment status items LABR0992 through LABR0294.
ELS:2002:	Calculated from month-by-month employment status items F2EM0209 through F2EM0402.

Type of first job. This variable only applies to sample members who had no postsecondary education enrollment; it was not asked of postsecondary enrollees. The seven categories are clerical, craftsperson, laborer/farmer, skilled operative, sales/service, managerial, and other.

HS&B: SY46A

NELS:88: JOBFIROC for respondents where NUMINST is 0

ELS:2002: F21STOCC

First and current job and sex composition of occupations. This variable only applies to sample members who had no postsecondary education enrollment; it was not asked of postsecondary enrollees. Information about first job held after graduation and job at the time of the 2-year post-graduation survey was combined with information about sex composition of

different occupations for ELS:2002 respondents. HS&B and NELS:88 did not code job types (when gathered) to codes that would enable matching to job sex composition data. ELS:2002 first and 2 years post-graduation job types were reported in F2ONET16 and F2ONETC6, respectively. These variables provided occupation type coded to 6-digit O*NET codes used by the Bureau of Labor Statistics. The codes in both distributions were matched to O*NET codes and levels reported by the Bureau of Labor Statistics (BLS) (2006) in *Women in the Workforce: A Databook*. These data represent sex composition as of 2004, the graduation year for most ELS:2002 analysis sample members (some sample members could have graduated as early as the previous September) and corresponding to the year in which most sample members obtained their first job.

Because national-level data on sex composition of different occupations is obtained by survey, not all occupations reflected in the ELS:2002 variables were listed with unique sex composition values in the BLS data. Rather, BLS collapsed some occupations into higher-level O*NET categories and reported sex composition for these collapsed groups as a whole. For ELS:2002 job types that were not specifically matched to BLS job types, the sex composition data was assigned to ELS:2002 job types on the basis of the higher-level BLS grouping data. Therefore the sex composition data for certain ELS:2002 occupations may be misrepresentative of the specific job occupied by the respondent.

Occupations were coded as female-dominated if the point estimate from the BLS data indicated that women occupied 50 percent or more of the jobs in that occupation. Otherwise, the occupation was coded as male-dominated. Although BLS estimates have measurement error and a point estimate near 50 percent may in truth indicate either female- or male-dominated jobs, this method allows all occupations in the ELS:2002 data to be coded.

Appendix A References

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Appendix B. Standard Errors for Main Tables

Appendix B provides standard errors for tables and figures presented in the main text. Tables of standard errors for the figures are presented after all standard error tables for regular tables. However, figures 1 and 4 do not have corresponding standard error tables because they repeat portions of larger tables (tables 6 and 20, respectively). Tables of standard errors for tables in appendix A are at the end of this appendix, after standard error tables for regular tables and figures from the main text.

Table B-1. Standard errors for table 1: Average number of credits (Carnegie units) earned by public high school graduates, by subject area: 1982, 1992, and 2004

Total and subject area	1982	1992	2004
Total credits earned	0.10	0.09	0.11
Total CTE credits earned	0.07	0.07	0.07
Family and consumer sciences education	0.02	0.02	0.01
General labor market preparation	0.02	0.03	0.03
Occupational area credits, total	0.05	0.05	0.06
Agriculture and natural resources	0.02	0.02	0.02
Architecture, construction, and science technology	0.01	0.02	0.01
Business	0.03	0.02	0.02
Communications and design	0.01	0.02	0.02
Computer and information science	0.01	0.01	0.02
Consumer and culinary services	0.01	0.02	0.01
Engineering technologies	0.01	0.01	0.01
Health sciences	0.01	0.01	0.01
Manufacturing, repair, and transportation	0.03	0.02	0.02
Marketing	0.01	0.01	0.01
Public services	0.01	#	0.01
Total academic credits earned	0.09	0.09	0.09
English	0.02	0.02	0.02
Mathematics	0.03	0.02	0.02
Science	0.02	0.03	0.02
Social studies	0.03	0.03	0.03
Fine arts	0.04	0.05	0.04
Non-English language	0.03	0.04	0.03
Total enrichment credits earned[1]	0.04	0.04	0.04

Rounds to zero

[1]Enrichment credits include courses such as physical education, religion, and military education.

NOTE: A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-2. Standard errors for table 2: Percentage of public high school graduates by total career and technical education (CTE) credits (Carnegie units) earned: 1982, 1992, and 2004

Number of CTE credits earned	1982	1992	2004
0	0.26	0.38	0.46
less than 1	0.33	0.64	0.38
1	0.77	0.87	0.59
2	0.67	1.01	0.67
3	0.54	0.91	0.56
4	0.63	0.87	0.49
5	0.70	0.67	0.42
6	0.49	0.41	0.40
7	0.48	0.46	0.30
8 or more	0.69	0.55	0.57

NOTE: A Carnegie unit is equivalent to a course taken for one period each day for one full school year. Credit categories are divided by the credit indicated up to (but not including) the next credit: for example, 1 credit to less than 2 credits, 2 credits to less than 3 credits, etc.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-3. Standard errors for table 3: Percentage of public high school graduates by total occupational credits (Carnegie units) earned: 1982, 1992, and 2004

Number of occupational credits earned	1982	1992	2004
0	0.57	0.80	0.71
less than 1	0.47	0.70	0.44
1	0.76	1.11	0.66
2	0.68	0.99	0.64
3	0.58	0.65	0.53
4	0.66	0.64	0.46
5	0.46	0.47	0.37
6	0.51	0.30	0.29
7	0.36	0.35	0.20
8 or more	0.44	0.25	0.34

NOTE: A Carnegie unit is equivalent to a course taken for one period each day for one full school year. Credit categories are divided by the credit indicated up to (but not including) the next credit: for example, 1 credit to less than 2 credits, 2 credits to less than 3 credits, etc.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-4. Standard errors for table 4: Percentage of public high school graduates by percentage of all credits (Carnegie units) earned in occupational courses: 1982, 1992, and 2004

Percent of all courses that were occupational	1982	1992	2004
0	0.57	0.80	0.71
>0 to <5	0.65	0.97	0.61
5 to <10	0.72	1.17	0.70
10 to <15	0.75	0.64	0.63
15 to <25	0.88	0.75	0.71
25 or more	0.76	0.46	0.41

NOTE: A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-5. Standard errors for table 5: Percentage of public high school graduates by number of occupational areas in which credit was received: 1982, 1992, and 2004

Number of occupational areas in which credit was received	1982	1992	2004
0	0.57	0.80	0.71
1	1.06	1.10	0.76
2	1.01	1.14	0.76
3	0.65	0.90	0.69
4	0.52	0.38	0.53
5	0.30	0.21	0.27
6 or more	0.13	0.15	0.21

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-6. Standard errors for table 6: Percentage of public high school graduates in categories of occupational coursetaking, by academic orientation: 1982, 1992, and 2004

	Total			Academic orientation					
				Academic focus			General education		
Classification of occupational coursetakers	1982	1992	2004	1982	1992	2004	1982	1992	2004
Noninvestors	1.10	1.18	1.18	2.06	1.38	1.38	1.21	1.81	1.56
Nonparticipants	0.74	0.95	0.93	2.78	1.36	1.14	0.66	1.28	1.17
Samplers	0.99	1.24	0.95	2.39	1.49	1.10	1.07	1.94	1.33
Occupational investors	1.10	1.18	1.18	2.06	1.38	1.38	1.21	1.81	1.56
Explorers	0.67	0.87	0.85	1.17	1.02	1.04	0.76	1.40	1.11
Concentrators	1.04	0.89	0.78	1.56	1.05	0.88	1.15	1.31	1.14

NOTE: Noninvestors are the sum of nonparticipants and samplers. Nonparticipants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-7. Standard errors for table 7: Relative percentage of public high school graduates, by academic orientation and occupational coursetaking categories: 1982, 1992, and 2004

Academic orientation and occupational coursetaking category	1982	1992	2004
Academic focus			
Nonparticipants	0.49	0.76	0.72
Samplers	0.43	0.91	0.80
Explorers	0.18	0.49	0.67
Concentrators	0.24	0.53	0.55
General education			
Nonparticipants	0.57	0.73	0.52
Samplers	0.97	1.18	0.72
Explorers	0.67	0.82	0.49
Concentrators	0.99	0.69	0.49

NOTE: Nonparticipants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-8. Standard errors for table 8: Percentage of public high school graduates, by academic orientation, student characteristics, and occupational coursetaking category: 1982, 1992, and 2004

Classification of occupational coursetakers and student characteristic	Total			Academic orientation					
				Academic focus			General education focus		
	1982	1992	2004	1982	1992	2004	1982	1992	2004
Gender									
Male									
Nonparticipants	0.95	1.32	0.95	3.43	1.95	1.18	0.83	1.96	1.31
Samplers	1.49	2.27	1.11	3.41	2.58	1.28	1.61	3.55	1.71
Explorers	1.14	1.39	1.07	2.26	1.49	1.34	1.30	2.27	1.52
Concentrators	1.39	1.49	1.05	2.00	2.13	1.23	1.51	2.11	1.52
Female									
Nonparticipants	1.00	1.24	1.21	3.48	2.01	1.51	0.99	1.46	1.64
Samplers	1.42	1.39	1.22	2.87	1.95	1.45	1.52	1.95	1.71
Explorers	0.90	0.96	0.98	1.34	1.31	1.15	1.01	1.29	1.30
Concentrators	1.42	0.94	0.82	2.42	0.94	1.00	1.56	1.46	1.19
Race/ethnicity[1]									
Asian/Pacific Islander									
Nonparticipants	4.27	3.38	2.18	8.59	4.48	2.68	5.12	4.86	3.02
Samplers	4.88	3.84	2.45	8.05	4.30	2.79	5.74	5.47	3.76
Explorers	3.03	3.25	1.75	4.06	2.15	2.08	3.56	5.74	2.93
Concentrators	2.59	4.41	1.27	4.16	3.19	1.57	3.41	8.17	2.16
Black									
Nonparticipants	1.85	3.94	1.68	5.70	5.28	1.98	1.76	5.24	2.51
Samplers	2.50	4.60	2.06	8.09	3.12	2.55	2.49	8.96	3.19
Explorers	2.05	3.49	1.64	3.36	4.48	2.04	2.43	5.88	2.17
Concentrators	2.63	2.92	1.87	6.04	2.60	2.31	2.67	4.50	2.64
Hispanic									
Nonparticipants	1.57	2.46	1.89	5.80	2.54	2.58	1.56	3.45	2.56
Samplers	2.08	4.76	1.96	8.29	5.38	2.60	2.19	7.41	2.57
Explorers	1.64	2.20	1.84	6.93	4.89	2.06	1.72	3.47	2.90
Concentrators	2.44	3.06	1.23	5.43	1.37	1.79	2.66	4.81	1.61
White									
Nonparticipants	0.84	1.19	1.14	3.30	1.70	1.41	0.73	1.65	1.48
Samplers	1.13	1.40	1.06	2.66	1.57	1.18	1.19	2.05	1.66
Explorers	0.76	1.00	1.07	1.49	1.07	1.32	0.84	1.52	1.37
Concentrators	1.16	1.13	0.99	1.77	1.31	1.09	1.29	1.61	1.46
Other									
Nonparticipants	5.55	5.26	2.21	18.80	19.46	3.33	5.89	4.74	2.96
Samplers	5.95	7.93	3.11	16.04	19.87	4.45	6.70	10.43	4.89
Explorers	4.20	8.37	2.21	‡	5.69	3.37	4.04	11.61	4.00
Concentrators	6.68	8.21	2.24	‡	‡	2.81	7.11	‡	3.58
Socioeconomic status									
Lowest quartile									
Nonparticipants	1.16	1.24	1.16	5.00	2.05	1.49	1.01	1.57	1.71
Samplers	2.29	2.41	1.47	3.92	3.82	1.92	2.40	3.17	2.28
Explorers	1.61	2.28	1.32	4.10	3.16	1.60	1.63	2.89	1.93
Concentrators	1.95	2.45	1.36	3.02	3.12	1.74	2.11	3.36	1.85

See notes at end of table.

Table B-8. Standard errors for table 8: Percentage of public high school graduates, by academic orientation, student characteristics, and occupational coursetaking category: 1982, 1992, and 2004—Continued

Classification of occupational coursetakers and student characteristic	Total			Academic orientation					
				Academic focus			General education focus		
	1982	1992	2004	1982	1992	2004	1982	1992	2004
Middle 2 quartiles									
Nonparticipants	0.83	1.08	0.96	3.90	1.69	1.18	0.69	1.44	1.31
Samplers	1.12	1.63	1.17	3.59	1.70	1.36	1.22	2.59	1.74
Explorers	0.88	1.08	1.04	1.82	1.55	1.36	1.02	1.58	1.27
Concentrators	1.31	0.99	0.94	2.89	1.16	1.12	1.44	1.58	1.38
Highest quartile									
Nonparticipants	1.71	2.38	1.68	5.00	2.57	2.03	1.79	4.10	2.50
Samplers	1.87	2.18	1.56	5.07	2.82	1.92	2.08	2.73	2.61
Explorers	1.31	1.30	1.14	1.92	1.15	1.30	1.54	2.35	2.05
Concentrators	1.33	1.07	0.92	1.15	1.20	1.11	1.62	1.71	1.58

‡ Reporting standards not met.

[1] Asian/Pacific Islander includes Native Hawaiian. Hispanic may be of any race. "Other" category refers to those answering "other" in 1982 and 1992 and those answering more than one race in 2004.

NOTE: Non-investors are the sum of non-participants and samplers. Non-participants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-9. Standard errors for table 9:Percentage of public high school graduates, by academic orientation, characteristics of school attended, and occupational coursetaking category: 1982, 1992, and 2004

Classification of occupational coursetakers and school characteristic	Total			Academic orientation					
				Academic focus			General education focus		
	1982	1992	2004	1982	1992	2004	1982	1992	2004
Size of 12th-grade school									
Small (less than 1,000 students)									
Nonparticipants	1.04	1.63	1.39	4.34	2.24	1.86	0.90	1.91	1.59
Samplers	1.76	1.95	1.48	3.48	2.21	1.76	1.85	2.89	2.01
Explorers	1.21	1.39	1.45	2.38	1.47	1.81	1.24	2.33	2.02
Concentrators	1.78	1.34	1.57	2.22	1.79	1.83	1.93	2.29	1.95
Medium (1,000 to 1,999 students)									
Nonparticipants	1.19	1.51	1.31	4.13	1.87	1.52	1.11	2.35	1.83
Samplers	1.53	1.88	1.41	3.76	2.53	1.62	1.75	2.56	2.10
Explorers	1.05	1.31	1.24	1.47	1.61	1.56	1.22	1.84	1.54
Concentrators	1.70	1.15	1.25	2.86	1.40	1.28	1.91	1.82	2.00
Large (more than 2,000 students)									
Nonparticipants	1.57	2.60	1.79	6.07	3.14	2.38	1.84	3.82	2.12
Samplers	1.94	4.39	1.77	5.10	4.87	2.29	2.03	6.94	2.33
Explorers	1.49	2.30	1.44	2.24	2.68	1.75	1.64	3.36	2.13
Concentrators	2.58	2.07	1.14	5.53	1.73	1.72	2.77	3.42	1.29
Urbanicity									
Urban									
Nonparticipants	1.60	2.49	1.28	4.86	3.15	1.68	1.60	3.66	1.49
Samplers	1.77	2.85	1.18	5.81	3.19	1.33	1.89	4.60	1.69
Explorers	1.66	2.01	1.24	2.67	2.82	1.46	1.84	3.31	1.50
Concentrators	2.18	1.68	1.10	2.63	1.79	1.24	2.40	2.51	1.57
Suburban									
Nonparticipants	1.20	1.79	1.94	3.68	2.57	2.32	1.12	2.22	2.48
Samplers	1.54	1.92	1.78	3.11	2.38	2.07	1.79	2.89	2.49
Explorers	0.86	1.27	1.98	1.56	1.30	2.44	1.04	1.99	2.68
Concentrators	1.64	1.47	1.63	2.54	1.31	1.77	1.82	2.25	2.55
Rural									
Nonparticipants	1.23	1.52	1.51	5.12	2.27	1.86	0.93	1.68	2.32
Samplers	1.49	1.27	1.84	3.65	1.89	2.33	1.55	2.21	2.59
Explorers	1.36	1.85	1.34	2.55	1.25	1.62	1.38	2.90	2.00
Concentrators	1.74	1.63	1.51	2.71	2.06	1.85	1.82	2.48	1.94

NOTE: Non-investors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-10. Standard errors for table 10: Average number of credits (Carnegie units) earned in academic subjects by public high school graduates, by academic orientation and occupational coursetaking category: 1982, 1992, and 2004

	Total			Academic orientation					
				Academic focus			General education		
Academic subject and occupational coursetaking category	1982	1992	2004	1982	1992	2004	1982	1992	2004
English									
Nonparticipants	0.05	0.03	0.04	0.09	0.03	0.05	0.06	0.06	0.08
Samplers	0.03	0.03	0.03	0.04	0.03	0.03	0.04	0.06	0.05
Explorers	0.04	0.04	0.04	0.08	0.04	0.04	0.04	0.05	0.06
Concentrators	0.04	0.03	0.04	0.44	0.05	0.04	0.03	0.04	0.05
Mathematics									
Nonparticipants	0.04	0.03	0.04	0.06	0.02	0.04	0.05	0.05	0.05
Samplers	0.03	0.03	0.03	0.05	0.02	0.03	0.04	0.04	0.04
Explorers	0.04	0.05	0.04	0.06	0.05	0.04	0.04	0.05	0.05
Concentrators	0.05	0.04	0.04	0.65	0.06	0.05	0.03	0.05	0.06
Science									
Nonparticipants	0.06	0.06	0.04	0.06	0.05	0.04	0.06	0.09	0.06
Samplers	0.04	0.04	0.03	0.05	0.04	0.03	0.04	0.04	0.04
Explorers	0.05	0.06	0.04	0.09	0.08	0.04	0.05	0.08	0.06
Concentrators	0.04	0.04	0.04	0.41	0.08	0.06	0.03	0.03	0.05
Social studies									
Nonparticipants	0.06	0.07	0.05	0.15	0.04	0.05	0.06	0.16	0.09
Samplers	0.04	0.04	0.04	0.05	0.03	0.04	0.04	0.05	0.06
Explorers	0.04	0.05	0.05	0.20	0.09	0.05	0.04	0.05	0.07
Concentrators	0.04	0.03	0.04	0.41	0.06	0.04	0.03	0.04	0.07
Fine arts									
Nonparticipants	0.07	0.19	0.10	0.14	0.10	0.12	0.08	0.46	0.13
Samplers	0.06	0.06	0.05	0.11	0.08	0.06	0.07	0.10	0.08
Explorers	0.06	0.07	0.05	0.21	0.09	0.07	0.06	0.09	0.08
Concentrators	0.06	0.04	0.06	0.19	0.07	0.08	0.06	0.04	0.08
Non-English Language									
Nonparticipants	0.07	0.08	0.05	0.12	0.08	0.06	0.08	0.16	0.08
Samplers	0.04	0.05	0.04	0.11	0.07	0.04	0.05	0.08	0.05
Explorers	0.05	0.06	0.04	0.15	0.09	0.06	0.05	0.08	0.05
Concentrators	0.03	0.05	0.04	0.13	0.09	0.06	0.03	0.05	0.06

NOTE: Noninvestors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-11. Standard errors for table 11: Percentage of public high school graduates completing given highest level of mathematics, by academic orientation and occupational concentration category: 1982, 1992, and 2004

Highest level of math completed and occupational coursetaking category	Total			Academic orientation					
				Academic focus			General education		
	1982	1992	2004	1982	1992	2004	1982	1992	2004
Nonparticipants									
No math or low academic math	1.44	2.24	0.75	1.03	0.32	0.39	1.84	5.26	1.84
Algebra I/plane geometry	1.83	1.25	1.26	2.55	1.18	1.21	2.36	2.71	2.48
Algebra II	1.91	2.82	1.48	3.56	3.72	1.83	1.94	3.92	2.40
Algebra III/trigonometry/analytic geometry	2.35	2.01	1.46	3.99	2.49	1.72	2.61	2.16	2.12
Precalculus/calculus	1.85	2.31	1.67	4.15	2.80	2.05	1.84	2.61	2.75
Samplers									
No math or low academic math	1.41	0.80	0.43	1.77	0.71	0.39	1.67	1.80	0.95
Algebra I/plane geometry	1.30	2.47	1.07	2.10	1.84	0.86	1.39	4.30	1.86
Algebra II	1.26	2.19	1.12	2.94	2.35	1.28	1.38	3.25	1.67
Algebra III/trigonometry/analytic geometry	0.94	1.30	1.19	3.53	2.34	1.30	0.94	1.31	1.71
Precalculus/calculus	1.00	1.25	1.27	3.14	2.08	1.57	0.92	1.74	1.87
Explorers									
No math or low academic math	1.95	1.23	0.79	4.31	0.95	0.86	2.14	1.75	1.26
Algebra I/plane geometry	2.23	3.12	1.31	4.98	1.28	1.19	2.32	4.35	2.22
Algebra II	1.59	2.34	1.58	5.95	3.10	2.11	1.54	3.14	2.00
Algebra III/trigonometry/analytic geometry	1.42	2.22	1.30	5.66	4.26	1.90	1.49	1.24	1.70
Precalculus/calculus	1.11	1.63	1.27	3.79	2.82	1.81	1.13	1.41	1.66
Concentrators									
No math or low academic math	1.70	1.85	0.97	5.52	1.72	0.98	1.76	2.36	1.90
Algebra I/plane geometry	1.57	1.52	1.66	9.96	2.36	1.79	1.65	1.92	2.63
Algebra II	1.09	1.88	1.69	6.53	4.22	2.27	1.05	1.73	2.52
Algebra III/trigonometry/analytic geometry	0.89	1.52	1.65	8.17	3.57	2.27	0.76	1.08	1.58
Precalculus/calculus	0.48	0.89	1.43	3.48	2.53	2.01	0.48	0.64	1.66

NOTE: Noninvestors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-12. Standard errors for table 12: Percentage of public high school graduates completing given highest level of science, by academic orientation and occupational concentration category: 1982, 1992, and 2004

Highest level of science completed and occupational coursetaking category	Total			Academic orientation					
				Academic focus			General education		
	1982	1992	2004	1982	1992	2004	1982	1992	2004
Nonparticipants									
No science or low level science	0.72	0.65	0.67	‡	†	0.43	0.98	1.72	1.53
Secondary physical science, basic biology	1.21	2.24	0.59	1.80	0.18	0.62	1.52	5.45	1.18
General biology	2.02	1.82	1.34	2.10	1.89	1.46	2.40	3.69	2.74
Advanced biology, chemistry, or physics	2.30	2.49	1.46	2.53	1.90	1.62	2.51	4.45	2.87
Samplers									
No science or low level science	1.11	0.25	0.36	†	†	0.15	1.37	0.49	0.85
Secondary physical science, basic biology	1.17	1.03	0.49	1.11	1.18	0.38	1.38	1.74	1.00
General biology	1.74	2.19	1.11	2.69	2.59	1.10	1.96	3.57	1.92
Advanced biology, chemistry, or physics	1.56	1.86	1.27	2.79	2.81	1.17	1.58	2.94	2.28
Explorers									
No science or low level science	2.05	0.74	0.58	†	†	0.15	2.18	1.23	1.34
Secondary physical science, basic biology	1.66	2.12	0.62	2.52	0.68	0.53	1.71	3.11	1.20
General biology	2.65	2.40	1.61	7.78	2.77	1.88	2.78	3.61	2.72
Advanced biology, chemistry, or physics	2.21	2.64	1.71	8.54	2.81	1.98	2.01	2.85	2.80
Concentrators									
No science or low level science	1.82	0.75	1.09	3.35	‡	‡	1.85	1.07	1.53
Secondary physical science, basic biology	1.69	1.21	0.91	7.67	0.82	0.82	1.67	1.57	1.67
General biology	1.77	2.43	2.00	8.07	6.12	2.54	1.78	2.01	2.78
Advanced biology, chemistry, or physics	1.33	2.21	2.03	10.05	6.14	2.72	1.29	1.67	2.79

† Not applicable.

‡ Reporting standards not met

NOTE: Noninvestors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-13. Standard errors for table 13: Course titles and percentage of public high school graduates earning at least one quarter credit (Carnegie unit) in the three most commonly completed career and technical education (CTE) courses: 1982, 1992, and 2004

Area	1982		1992		2004	
All CTE courses						
Course	Typewriting 1	1.03	Typewriting 1	1.45	Keyboarding	1.44
Course	Accounting 1	0.90	Computer Appreciation	1.35	Foods 1	0.87
Course	Business Introduction	0.86	Accounting 1	1.16	Desktop Computer Application Suites	1.27
Family and consumer sciences education						
Course	Home Economics 1	0.71	Foods 1	0.93	Foods 1	0.87
Course	Foods 1	0.81	Home Economics 1	1.13	Adult Roles and Functions	0.75
Course	Family Relations	0.86	Family Relations	1.09	Home Economics 1	0.62
General labor market preparation						
Course	Typewriting 1	1.03	Typewriting 1	1.45	Keyboarding	1.44
Course	Typewriting, Personal	0.66	Computer Appreciation	1.35	Desktop Computer Application Suites	1.27
Course	Industrial Arts 1	0.64	Keyboarding	1.16	Career Exploration	1.08
Occupational areas						
Course	Accounting 1	0.90	Accounting 1	1.16	Computer Applications	1.08
Course	Business Introduction	0.86	Drafting 1	0.86	Business Computer Programming 1	1.07
Course	Typewriting 2	0.79	Business Introduction	0.72	Accounting 1	0.52

NOTE: A Carnegie unit is equivalent to a course taken for one period each day for one full school year. Course titles may not reflect the full course title as listed in the Classification of Secondary School Courses (CSSC).

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-14. Standard errors for table 14: Course titles and percentage of public high school graduates earning at least one quarter credit (Carnegie unit) in the three most commonly completed occupational area courses: 1982, 1992, and 2004

Area	1982		1992		2004	
Agriculture and natural resources						
Course	Agricultural Occupations 1	0.44	Agricultural Fundamentals	0.38	Agricultural Fundamentals	0.60
Course	Agricultural Fundamentals	0.34	Agricultural Occupations 1	0.40	Animal Sciences 1	0.30
Course	Horticulture	0.25	Horticulture	0.24	Horticulture	0.25
Architecture, construction, and science technology						
Course	Electricity 1	0.30	Architectural Drawing 1	0.19	Building Construction 1	0.34
Course	Architectural Drawing 1	0.33	Building Construction 1	0.24	Architectural Drawing 1	0.20
Course	Building Construction 1	0.27	Electricity 1	0.35	Carpentry 1	0.21
Business						
Course	Accounting 1	0.90	Accounting 1	0.81	Business Computer Programming 1	1.07
Course	Business Introduction	0.86	Business Introduction	0.72	Accounting 1	0.52
Course	Typewriting 2	0.79	Word Processing 1	0.57	Business Introduction	0.76
Communications and design						
Course	Graphic Arts 1	0.38	Yearbook Production 1	0.64	Yearbook Production 1	0.31
Course	Channels of Communication	0.49	Graphic Arts 1	0.57	Desktop Publishing	0.39
Course	Yearbook Production 1	0.29	Housing and Interior Design 1;	0.33	Computer Graphics Design	0.36
Computer and information science						
Course	Computer Programming 1	0.50	Computer Problem Solving	0.74	Computer Applications	1.08
Course	Data Processing	0.40	BASIC, Introduction	0.61	Web Site Design, Development	0.40
Course	Computer Problem Solving	0.37	Data Processing, Introduction	0.90	Computer Programming 1	0.37
Consumer and culinary services						
Course	Child Development 1	0.64	Child Development 1	0.64	Child Development 1	0.54
Course	Child Care Services	0.23	Child Care Services	0.28	Nutrition	0.43
Course	Food Service Training 1	0.19	Nutrition	0.28	Food Service Training 1	0.53

See notes at end of table.

Table B-14. Standard errors for table 14: Course titles and percentage of public high school graduates earning at least one quarter credit (Carnegie unit) in the three most commonly completed occupational area courses: 1982, 1992, and 2004—Continued

Area	1982		1992		2004	
Engineering technologies						
Course	Drafting 1	0.78	Drafting 1	0.86	Drafting 1	0.43
Course	Drafting 2	0.30	Drafting 2	0.34	Computer-Assisted Design/Drafting	0.48
Course	Machine Drawing	0.10	Machine Drawing	0.35	Drafting 2	0.20
Health sciences						
Course	Health Occupations 1	0.28	Health Occupations 1	0.15	Health Occupations 1	0.36
Course	First Aid	0.18	First Aid	0.23	First Aid	0.48
Course	Chemical Technology 1	0.23	Sports Medicine	0.17	Sports Medicine	0.28
Manufacturing, repair, and transportation						
Course	Woodworking 1	0.68	Woodworking 1	0.58	Woodworking 1	0.45
Course	Clothing Construction	0.47	Clothing Construction	0.63	Auto Mechanics 1	0.42
Course	Metal Trades	0.41	Auto Mechanics 1	0.38	Welding 1	0.27
Marketing						
Course	Distributive Education 1	0.42	Distributive Education 1	0.45	Distributive Education 1	0.44
Course	Distributive Education 1, Cooperative	0.30	Distributive Education 1, Cooperative	0.26	Distributive Education 1, Cooperative	0.29
Course	Distributive Education 2	0.19	Distributive Education 2	0.18	Distributive Education 2	0.19
Public Services						
Course	Teacher Aide/Elementary	0.38	Community Services, Other	0.32	Law Enforcement	0.32
Course	Library Assistant	0.27	Library Assistant; Library Aide	0.28	Law Science	0.35
Course	Library Science	0.31	Library Science; Library Skills	0.14	Teacher Aide/Elementary	0.31

NOTE: A Carnegie unit is equivalent to a course taken for one period each day for one full school year. Course titles may not reflect the full course title as listed in the Classification of Secondary School Courses (CSSC).

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-15. Standard errors for table 15: Coefficients from ordinary least squares regression of total career and technical education (CTE) credits on academic credits earned: 1982, 1992, and 2004

Independent variable(s)	1982	1992	2004
Single-variable models			
Total academic credits	0.008	0.007	0.017
Total math credits	0.029	0.035	0.060
Highest math credit is algebra II or greater	0.025	0.021	0.040
Total science credits	0.027	0.028	0.048
Two-variable model			
Total math credits	0.033	0.040	0.062
Total science credits	0.031	0.032	0.050

NOTE: Credits refer to Carnegie units. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-16. Standard errors for table 16: Coefficients from ordinary least squares regression of total occupational area credits on academic credits earned: 1982, 1992, and 2004

Independent variable(s)	1982	1992	2004
Single-variable models			
Total academic credits	0.007	0.006	0.013
Total math credits	0.026	0.030	0.044
Highest math credit is algebra II or greater	0.023	0.019	0.030
Total science credits	0.024	0.024	0.035
Two-variable model			
Total math credits	0.030	0.034	0.046
Total science credits	0.028	0.028	0.017

NOTE: Credits refer to Carnegie units. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-17. Standard errors for table 17: Average estimated number-right math scores of public high school graduates, by academic orientation and occupational coursetaking categories: 1982, 1992, and 2004

	Total		Academic orientation			
			Academic focus		General education	
Classification of occupational coursetakers	1992	2004	1992	2004	1992	2004
Noninvestors						
Nonparticipants	0.82	0.55	0.51	0.58	1.67	1.02
Samplers	0.44	0.36	0.75	0.42	0.74	0.58
Occupational investors						
Explorers	0.93	0.41	1.31	0.58	0.84	0.60
Concentrators	0.57	0.51	1.01	0.77	0.61	0.64

NOTE: Math scores represent the item response theory (IRT)-estimated number correct students would have answered had they received all test question in the test item pool; the scale runs from 0-81. Nonparticipants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-18. Standard errors for table 18: Standardized mean difference (effect size) for the 1992 to 2004 change in math scores of public high school graduates, by occupational coursetaking category: 1992 and 2004

Group	1992	2004
Total	0.33	0.27
Occupational coursetaking category		
Occupational noninvestor		
Nonparticipant	0.82	0.55
Sampler	0.44	0.36
Occupational investor		
Explorer	0.93	0.41
Concentrator	0.57	0.51

NOTE: Math scores represent the item response theory (IRT)-estimated number correct students would have answered had they received all test question in the test item pool; the scale runs from 0-81. Nonparticipants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-19. Standard errors for table 19: Percentage of public high school graduates with given educational expectations in 12th grade, by academic orientation and occupational coursetaking category: 1982, 1992, and 2004

Occupational coursetaking category and educational expectations	Total			Academic orientation					
				Academic focus			General education		
	1982	1992	2004	1982	1992	2004	1982	1992	2004
Nonparticipants									
High school or less	1.07	0.28	0.49	2.26	0.29	0.47	1.28	0.57	1.11
Some college	1.83	2.80	1.07	3.55	2.63	1.28	2.10	5.12	2.14
Bachelor's degree	1.71	2.29	1.42	3.07	3.26	1.73	2.27	3.54	2.27
Graduate or professional degree	1.95	2.83	1.58	2.74	2.72	2.03	2.34	4.28	2.54
Don't know	—	1.43	0.60	—	0.38	0.65	—	3.64	1.19
Samplers									
High school or less	0.86	0.98	0.35	1.11	0.49	0.37	1.03	1.78	0.66
Some college	1.28	1.71	0.84	2.74	1.52	0.89	1.57	2.84	1.53
Bachelor's degree	1.27	1.75	0.99	2.90	1.69	1.20	1.49	3.04	1.53
Graduate or professional degree	1.19	1.87	1.02	2.89	2.33	1.18	1.24	1.84	1.74
Don't know	—	0.52	0.54	—	0.47	0.55	—	0.96	0.99
Explorers									
High school or less	1.74	0.59	0.54	3.81	0.52	0.61	1.91	0.98	1.03
Some college	2.25	3.43	1.27	4.52	4.51	1.47	2.42	3.78	2.20
Bachelor's degree	1.86	2.86	1.41	6.36	4.66	1.78	1.99	3.46	2.46
Graduate or professional degree	1.33	2.56	1.28	5.52	3.51	1.71	1.46	3.29	1.82
Don't know	—	0.86	0.75	—	0.93	0.84	—	1.25	1.43
Concentrators									
High school or less	1.65	1.30	0.80	3.72	3.85	1.06	1.65	0.98	1.19
Some college	1.69	2.15	1.48	10.13	2.54	1.73	1.79	2.43	2.48
Bachelor's degree	1.14	1.84	1.38	9.22	4.61	2.04	1.14	1.38	2.18
Graduate or professional degree	1.01	1.33	1.40	4.90	3.74	1.93	0.95	1.42	1.96
Don't know	—	1.13	0.83	—	1.70	0.97	—	1.27	1.44

— Not available

NOTE: Noninvestors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-20. Standard errors for table 20: Percentage of public high school graduates ever enrolled in a postsecondary education institution in the first 2 years after graduation, by academic orientation and occupational coursetaking categories: 1982, 1992, and 2004

				Academic orientation					
	Total			Academic focus			General education		
Classification of occupational coursetakers	1984	1994	2006	1984	1994	2006	1984	1994	2006
Noninvestors									
Nonparticipants	1.66	1.53	1.16	3.12	0.79	1.38	1.98	3.87	2.03
Samplers	1.35	2.18	0.93	2.24	1.47	0.95	1.42	3.87	1.77
Occupational investors									
Explorers	2.30	2.73	1.24	5.47	3.64	1.33	2.50	3.10	2.42
Concentrators	1.83	2.23	1.61	10.07	4.10	2.06	1.66	2.60	2.78

NOTE: Nonparticipants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/84), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992" and "Third Follow-up, 1994"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004" and "Second Follow-up, 2006."

Table B-21. Standard errors for table 21: Percentage of college-attending 1982, 1992, and 2004 public high school graduates enrolled full-time at first postsecondary education institution after graduation, by academic orientation and occupational coursetaking categories: 1984, 1994, and 2006

				Academic orientation					
	Total			Academic focus			General education		
Classification of occupational coursetakers	1982	1992	2004	1982	1992	2004	1982	1992	2004
Noninvestors									
Nonparticipants	1.38	2.56	0.91	2.21	3.68	1.13	1.55	2.23	2.01
Samplers	1.21	1.96	0.89	1.39	0.76	0.92	1.41	3.92	1.83
Occupational investors									
Explorers	2.23	2.22	1.23	5.87	1.32	1.14	2.36	3.31	2.63
Concentrators	2.08	1.49	1.62	4.60	2.59	1.74	2.15	1.78	2.95

NOTE: Nonparticipants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/84), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992" and "Third Follow-up, 1994"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004" and "Second Follow-up, 2006."

Table B-22. Standard errors for table 22: Percentage of college-attending public high school graduates first enrolling in a four-year postsecondary institution after graduation, by academic orientation and occupational coursetaking categories: 1982, 1992, and 2004

	Total			Academic orientation					
				Academic focus			General education		
Classification of occupational coursetakers	1982	1992	2004	1982	1992	2004	1982	1992	2004
Noninvestors									
Nonparticipants	2.41	3.54	2.03	3.96	3.93	2.11	3.00	6.74	3.28
Samplers	1.71	2.08	1.32	3.55	2.24	1.52	1.97	3.43	2.26
Occupational investors									
Explorers	2.75	3.12	2.12	6.19	3.35	2.34	3.03	3.63	3.33
Concentrators	2.16	2.41	2.41	10.53	4.15	3.20	2.14	2.49	3.74

NOTE: Nonparticipants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/84), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992" and "Third Follow-up, 1994"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004" and "Second Follow-up, 2006."

Table B-23. Standard errors for table 23: Initial postsecondary education enrollment patterns of college-attending public high school graduates, by academic orientation and occupational coursetaking category: 1982, 1992, and 2004

	Total			Academic orientation					
				Academic focus			General education		
Occupational coursetaking category and initial enrollment pattern	1982	1992	2004	1982	1992	2004	1982	1992	2004
Nonparticipants									
% enrolled immediately after graduation	1.25	2.82	1.00	2.02	2.29	1.18	1.59	5.93	2.28
% enrolled 2 years after graduation	1.96	1.58	1.33	2.66	1.75	1.59	2.33	3.18	2.50
Samplers									
% enrolled immediately after graduation	0.98	1.12	0.90	1.74	0.93	0.82	1.21	2.40	1.84
% enrolled 2 years after graduation	1.82	1.43	1.03	3.09	1.11	1.17	1.92	3.34	1.79
Explorers									
% enrolled immediately after graduation	2.36	1.87	1.11	6.23	2.86	1.27	2.41	3.69	2.07
% enrolled 2 years after graduation	2.91	2.60	1.45	5.34	1.96	1.64	3.19	3.99	2.76
Concentrators									
% enrolled immediately after graduation	2.04	1.81	1.39	5.80	3.20	1.62	2.08	2.40	2.46
% enrolled 2 years after graduation	2.15	2.35	1.77	8.97	4.56	2.25	2.26	2.70	2.84

NOTE: Noninvestors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/84), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992" and "Third Follow-up, 1994"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004" and "Second Follow-up, 2006."

Table B-24. Standard errors for table 24: Percentage of public high school graduates with given expectations of occupation at age 30, by occupational coursetaking category: 1982, 1992, and 2004

	Occupational noninvestor			Occupational investor					
				Explorer			Concentrator		
Occupational expectation	1982	1992	2004	1982	1992	2004	1982	1992	2004
Clerical	0.54	0.39	0.16	0.94	0.82	0.24	1.38	0.77	0.31
Craftsmen	0.51	0.11	0.34	1.10	0.52	0.82	1.22	1.24	1.16
Farmer	0.26	0.15	‡	0.59	0.41	0.13	0.71	0.57	0.35
Homemaker	0.42	0.26	‡	0.55	0.42	‡	0.55	0.22	#
Laborer	0.24	0.05	0.09	0.29	0.55	0.25	0.28	0.30	0.38
Manager	0.76	0.43	0.41	1.16	0.83	0.57	0.86	0.86	0.81
Military	0.35	0.22	0.22	0.62	0.41	0.41	0.53	0.81	0.45
Operative	0.36	1.10	0.06	0.74	0.18	0.35	0.72	0.93	0.58
Professional	1.22	1.81	1.05	1.89	2.99	1.96	1.43	1.92	1.79
Proprietor	0.41	0.78	0.35	0.88	0.67	0.62	0.99	1.11	0.94
Protective services	0.24	0.60	0.44	0.44	1.75	0.72	0.42	0.54	0.75
Sales	0.31	0.40	0.30	0.61	0.51	0.50	0.39	0.24	0.47
Service	0.36	0.60	0.48	0.79	0.82	1.04	0.71	1.35	0.88
Technical	0.87	0.74	0.47	1.81	1.05	1.00	0.91	0.98	1.04
Other	0.43	1.17	0.18	1.04	1.73	0.33	0.58	1.14	0.37

‡ Reporting standards not met

Rounds to zero

NOTE: Noninvestors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-25. Standard errors for table 25: Percentage of public high school graduates stating that the given work goal was "very important," by academic orientation and occupational coursetaking category: 1982, 1992, and 2004

Work goal and occupational coursetaking category	Total			Academic orientation					
				Academic focus			General education		
	1982	1992	2004	1982	1992	2004	1982	1992	2004
Having lots of money									
Nonparticipants	2.61	2.71	1.24	2.84	2.48	1.40	3.43	4.94	2.34
Samplers	1.80	1.78	0.95	3.36	2.11	1.23	1.92	2.99	1.68
Explorers	1.94	2.52	1.47	5.59	3.72	1.89	2.09	3.00	2.21
Concentrators	1.80	1.83	1.69	7.95	4.13	2.12	1.82	1.87	2.78
Being able to find steady work									
Nonparticipants	1.45	2.61	1.11	2.98	3.32	1.18	1.56	2.82	2.12
Samplers	0.92	1.10	0.69	1.64	1.39	0.90	1.07	1.65	1.12
Explorers	1.33	1.56	0.93	4.48	1.63	1.34	1.41	2.17	1.54
Concentrators	0.99	0.99	1.01	7.73	1.62	1.19	1.05	1.24	1.61
Being successful in a line of work									
Nonparticipants	1.52	2.55	0.87	3.36	3.39	1.06	1.37	2.06	1.48
Samplers	0.94	1.19	0.51	1.90	2.01	0.61	1.00	1.24	0.89
Explorers	1.77	1.74	0.84	5.41	3.30	1.17	1.84	1.98	1.33
Concentrators	1.03	1.24	0.81	8.79	2.32	0.95	1.08	1.47	1.28

NOTE: Noninvestors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-26. Standard errors for table 26: Percentage of public high school graduates with given employment experiences, by academic orientation and occupational coursetaking category: 1982, 1992, and 2004

Occupational coursetaking category and work experiences	Total		Academic orientation			
			Academic focus		General education	
	1992	2004	1992	2004	1992	2004
Nonparticipants						
Weekly hours spent working in senior year						
Did not work	32.2	27.2	30.3	26.2	35.2	28.9
1-15 hours	41.0	35.9	43.5	36.3	37.0	35.3
16 or more hours	26.8	36.9	26.2	37.5	27.8	35.8
Samplers						
Weekly hours spent working in senior year						
Did not work	28.4	24.3	28.9	23.7	27.8	25.4
1-15 hours	29.3	30.7	34.9	32.8	23.5	27.5
16 or more hours	42.3	45.0	36.2	43.5	48.7	47.1
Explorers						
Weekly hours spent working in senior year						
Did not work	27.8	21.3	30.4	21.0	26.1	21.7
1-15 hours	32.6	31.2	34.7	31.4	31.2	30.9
16 or more hours	39.7	47.5	34.9	47.6	42.7	47.4
Concentrators						
Weekly hours spent working in senior year						
Did not work	24.6	19.0	26.8	18.6	23.7	19.5
1-15 hours	22.5	26.0	25.7	28.2	21.3	23.0
16 or more hours	52.8	55.0	47.6	53.2	55.0	57.5

— Not available.

NOTE: Noninvestors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-27. Standard errors for table 27: Percentage of 1982, 1992, and 2004 public high school graduates ever employed in the first 2 years after graduation, by academic orientation and occupational coursetaking categories: 1984, 1994, and 2006

				Academic orientation					
	Total			Academic focus			General education focus		
Classification of occupational coursetakers	1984	1994	2006	1984	1994	2006	1984	1994	2006
Noninvestors									
Nonparticipants	1.05	3.03	0.84	1.90	3.57	0.85	1.31	5.46	1.63
Samplers	0.61	0.62	0.57	1.49	0.76	0.87	0.67	1.00	0.85
Occupational investors									
Explorers	0.84	1.62	0.63	1.50	2.95	0.89	0.90	1.71	1.04
Concentrators	0.66	0.68	0.78	2.20	1.01	0.94	0.68	0.90	1.39

NOTE: Nonparticipants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/84), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992" and "Third Follow-up, 1994"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004" and "Second Follow-up, 2006."

Table B-28. Standard errors for table 28: Average number of months non-college-attending 1982, 1982, and 2004 public high school graduates were employed in first two 2 years after graduation, by academic orientation and occupational coursetaking categories: 1984, 1994, and 2006

				Academic orientation					
	Total			Academic focus			General education focus		
Classification of occupational coursetakers	1984	1994	2006	1984	1994	2006	1984	1994	2006
Noninvestors									
Nonparticipants	0.76	0.48	0.57	2.05	0.59	0.67	0.83	1.02	0.89
Samplers	0.42	0.23	0.32	3.05	0.27	0.44	0.43	0.41	0.44
Occupational investors									
Explorers	0.76	0.49	0.37	2.37	0.59	0.61	0.77	0.68	0.49
Concentrators	0.33	0.34	0.34	3.13	0.63	0.52	0.34	0.45	0.48

NOTE: Nonparticipants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/84), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992" and "Third Follow-up, 1994"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004" and "Second Follow-up, 2006."

Table B-29. Standard errors for table 29: Percentage of non-college-attending public high school graduates in first job type, by occupational coursetaking category: 1984, 1994, and 2006

	Occupational noninvestor			Occupational investor					
				Explorer			Concentrator		
Type of first job	1984	1994	2006	1984	1994	2006	1984	1994	2006
Clerical	2.75	4.36	1.16	4.13	3.07	2.15	2.06	3.09	1.72
Craftsperson	1.18	1.02	0.99	2.20	2.13	1.62	1.35	2.78	1.80
Laborer/farmer	1.84	6.06	1.02	3.92	5.25	1.75	1.82	1.95	2.08
Skilled operative	2.12	1.59	1.05	2.60	1.73	1.70	1.38	1.78	1.74
Sales/service	2.75	3.64	1.98	4.11	4.32	2.85	2.51	2.60	2.52
Managerial	0.97	2.32	0.96	1.86	2.41	1.18	0.67	1.22	1.16
Other	1.74	1.06	1.03	1.94	1.93	1.45	1.35	2.48	1.19

NOTE: Noninvestors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/84), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992" and "Third Follow-up, 1994"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004" and "Second Follow-up, 2006."

Table B-30. Standard errors for table 30: Percentage of non-college-attending public high school graduates whose job(s) after graduation were in an opposite-sex-dominated field, by academic orientation and occupational coursetaking classification: 2004-2006

Occupational coursetaking category and sex composition of field	Total	Academic orientation	
		Academic focus	General education
Nonparticipants			
Women in male-dominated occupation			
First job after graduation	4.99	6.60	6.91
Job two years after graduation	3.80	4.86	6.37
Men in female-dominated occupation			
First job after graduation	4.90	5.89	6.92
Job two years after graduation	5.58	7.92	7.02
Samplers			
Women in male-dominated occupation			
First job after graduation	2.51	3.26	3.81
Job two years after graduation	2.91	3.57	4.23
Men in female-dominated occupation			
First job after graduation	2.82	4.21	3.66
Job two years after graduation	2.94	4.20	3.99
Explorers			
Women in male-dominated occupation			
First job after graduation	3.87	5.63	5.21
Job two years after graduation	3.81	5.39	5.42
Men in female-dominated occupation			
First job after graduation	3.21	5.18	4.55
Job two years after graduation	3.03	4.40	4.07
Concentrators			
Women in male-dominated occupation			
First job after graduation	3.74	4.85	5.79
Job two years after graduation	3.62	5.74	4.73
Men in female-dominated occupation			
First job after graduation	2.91	4.36	3.75
Job two years after graduation	2.59	3.61	3.47

NOTE: Noninvestors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004" and "Second Follow-up, 2006"

Table B-31. Standard errors for figure 2: Percentage of high school graduates, by academic orientation: 1982, 1992, and 2004

Academic orientation	1982	1992	2004
Academic focus	0.71	1.35	1.11
General education focus	0.71	1.35	1.11

NOTE: Graduates with an academic focus earned at least 4 credits (Carnegie units) in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-32. Standard errors for figure 3: Percentage of public high school graduates completing four-year college preparatory requirements, by occupational coursetaking category: 1982, 1992, and 2004.

Occupational coursetaking category	1982	1992	2004
Occupational non-investor			
Non-participant	2.49	2.78	1.96
Sampler	0.79	1.57	1.46
Occupational investor			
Explorer	0.73	2.85	1.77
Concentrator	0.41	1.42	1.77

NOTE: The criteria for four-year college preparation are at least: four credits in English; three credits in mathematics at the level of algebra I or higher; two credits in biology and/or chemistry; two credits in social studies with at least one in world or U.S. history; and two credits in one non-English (foreign) language. Non-investors earned less than 3 total occupational credits (Carnegie units). Investors are the sum of explorers and concentrators. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study"; National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-33. Standard errors for table A-1: Percentage of public high school graduate sample with specific occupational expectations for age 30 versus the same sample with "don't know" responses included, by student characteristics: 2004

Characteristic	Sample excluding "don't know" responses	Sample including "don't know" responses
Total		
Specific occupational expectations	0.00	0.60
Don't know	†	0.60
Sex		
Male	0.69	0.71
Female	0.69	0.71
Race/ethnicity[1]		
Asian/Pacific Islander	0.26	0.31
Black	0.72	0.67
Hispanic	0.75	0.76
White	0.95	1.03
Other	0.33	0.39
Socioeconomic status		
Lowest quartile	0.74	0.74
Middle 2 quartiles	0.69	0.73
Highest quartile	0.79	0.86
Future goals		
Expects at least a bachelor's degree	0.69	0.64
Finding steady work is very important	0.40	0.46
Math achievement		
Estimated number-right score (mean)	0.26	0.27
Level 1 proficiency	0.16	0.16
Level 2 proficiency	0.61	0.62
Level 3 proficiency	0.79	0.82
Level 4 proficiency	0.75	0.78
Level 5 proficiency	0.22	0.24

† Not applicable

[1] Asian/Pacific Islander includes Native Hawaiian. Hispanic may be of any race. "Other" category refers to those answering "other" in 1982 and 1992 and those answering more than one race in 2004.

N = 5,900 for excluded "don't know" sample; N = 8,300 for included "don't know" sample.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-34. Standard errors for table A-2: Percentage of public high school graduates by highest level of credits (Carnegie units) earned in any one occupational area, for two groupings of occupational areas: 2004

	Number of occupational areas	
Highest number of credits earned in 1 area	11 areas	21 areas
0	0.72	0.72
<1	0.64	0.67
1	0.89	0.95
2	0.63	0.65
3	0.49	0.45
4	0.30	0.28
5 or more	0.37	0.36

NOTE: A Carnegie unit is equivalent to a course taken for one period each day for one full school year. Credit categories are divided by the credit indicated up to (but not including) the next credit: for example, 1 credit to less than 2 credits, 2 credits to less than 3 credits, etc.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-35. Standard errors for table A-3: Percentage of public high school graduates at the highest number of credits (Carnegie units) earned in any one occupational area, by total occupational credits earned: 1982

	Highest number of credits earned in one occupational area							
Total occupational credits	0	<1	1	2	3	4	5 or more	Row total
0	0.57	†	†	†	†	†	†	0.57
less than 1	†	0.47	†	†	†	†	†	0.47
1	†	0.35	0.66	†	†	†	†	0.76
2	†	0.08	0.55	0.54	†	†	†	0.68
3	†	‡	0.34	0.43	0.34	†	†	0.58
4	†	†	0.17	0.35	0.30	0.30	†	0.66
5	†	†	0.06	0.21	0.20	0.20	0.29	0.46
6	†	†	†	0.13	0.18	0.18	0.35	0.51
7	†	†	†	†	0.24	0.14	0.27	0.36
8 or more	†	†	†	0.04	0.05	0.10	0.44	0.44
Column total	0.57	0.65	0.96	0.74	0.68	0.46	0.78	0.00

† Not applicable

Rounds to zero

‡ Reporting standards not met

NOTE: A Carnegie unit is equivalent to a course taken for one period each day for one full school year. Credit categories are divided by the credit indicated up to (but not including) the next credit: for example, 1 credit to less than 2 credits, 2 credits to less than 3 credits, etc.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond Longitudinal Study of 1980 Sophomores (HS&B-So:80/82), "High School Transcript Study."

Table B-36. Standard errors for table A-4: Percentage of public high school graduates at the highest number of credits (Carnegie units) earned in any one occupational area, by total occupational credits earned: 1992

	Highest number of credits earned in one occupational area							
Total occupational credits	0	<1	1	2	3	4	5 or more	Row total
0	0.80	†	†	†	†	†	†	0.80
less than 1	†	0.70	†	†	†	†	†	0.70
1	†	0.43	1.06	†	†	†	†	1.11
2	†	0.04	0.81	0.54	†	†	†	0.99
3	†	‡	0.65	0.39	0.31	†	†	0.65
4	†	†	0.14	0.28	0.43	0.22	†	0.64
5	†	†	0.05	0.21	0.21	0.23	0.12	0.47
6	†	†	‡	0.15	0.12	0.13	0.20	0.30
7	†	†	†	‡	0.09	0.18	0.26	0.35
8 or more	†	†	†	†	0.03	0.06	0.24	0.25
Column total	0.80	0.86	1.12	0.80	0.62	0.42	0.42	0.00

† Not applicable

Rounds to zero

‡ Reporting standards not met

NOTE: A Carnegie unit is equivalent to a course taken for one period each day for one full school year. Credit categories are divided by the credit indicated up to (but not including) the next credit: for example, 1 credit to less than 2 credits, 2 credits to less than 3 credits, etc.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992."

Table B-37. Standard errors for table A-5: Percentage of public high school graduates at the highest number of credits (Carnegie units) earned in any one occupational area, by total occupational credits earned: 2004

	Highest number of credits earned in one occupational area							
Total occupational credits	0	<1	1	2	3	4	5 or more	Row total
0	0.73	†	†	†	†	†	†	0.71
less than 1	†	0.47	†	†	†	†	†	0.44
1	†	0.34	0.09	†	†	†	†	0.66
2	†	0.01	0.63	0.60	†	†	†	0.64
3	†	‡	0.18	0.07	0.00	†	†	0.53
4	†	†	0.00	0.34	0.36	0.29	†	0.46
5	†	†	0.21	0.13	0.07	0.03	0.27	0.37
6	†	†	0.22	0.21	0.16	0.10	0.09	0.29
7	†	†	‡	0.19	0.11	0.09	0.12	0.20
8 or more	†	†	†	0.08	0.14	0.13	0.31	0.34
Column total	0.71	0.57	0.96	0.64	0.49	0.30	0.39	0.00

† Not applicable

Rounds to zero

‡ Reporting standards not met

NOTE: A Carnegie unit is equivalent to a course taken for one period each day for one full school year. Credit categories are divided by the credit indicated up to (but not including) the next credit: for example, 1 credit to less than 2 credits, 2 credits to less than 3 credits, etc.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table B-38. Standard errors for table A-6: Probability of mathematics proficiency and standardized mean difference (effect size) for 1992 to 2004 change in probabilities of public high school graduates, by occupational coursetaking category: 1992 and 2004

Occupational coursetaking category and level of math proficiency	1992	2004
Total		
Level 1	0.005	0.002
Level 2	0.013	0.006
Level 3	0.015	0.008
Level 4	0.011	0.008
Level 5	0.004	0.002
Occupational coursetaking category		
Occupational noninvestor		
Nonparticipant		
Level 1	0.005	0.005
Level 2	0.031	0.013
Level 3	0.031	0.014
Level 4	0.033	0.015
Level 5	0.006	0.006
Sampler		
Level 1	0.009	0.003
Level 2	0.017	0.009
Level 3	0.027	0.011
Level 4	0.017	0.010
Level 5	0.008	0.003
Occupational investor		
Explorer		
Level 1	0.008	0.003
Level 2	0.025	0.011
Level 3	0.042	0.014
Level 4	0.022	0.012
Level 5	0.006	0.003
Concentrator		
Level 1	0.011	0.003
Level 2	0.022	0.013
Level 3	0.021	0.017
Level 4	0.022	0.014
Level 5	0.007	0.005

NOTE: Nonparticipants earned zero or less than 1 total occupational credits (Carnegie units); samplers earned 1 to less than 3 total occupational credits. Explorers earned 3 or more total occupational credits but did not concentrate in an occupational area. Concentrators earned 3 or more credits in at least one occupational area. Graduates with an academic focus earned at least 4 credits in English and 3 credits each in mathematics, science, and social studies; graduates with a general education focus did not meet these requirements. A Carnegie unit is equivalent to a course taken for one period each day for one full school year.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Appendix C. Fixed-effects Regression Analysis of Mathematics Achievement and Occupational Coursetaking: 1992 and 2004

The following analysis extends the analysis of ELS:2002 data found in Bozick and Dalton (2013) to the NELS:88 sample used in this report (due to an non-comparable scale measure found in HS&B, the 1982 class is not examined here). In that analysis, Bozick and Dalton analyzed senior-year mathematics assessment outcomes for a sample from ELS:2002 who had graduated from public high schools in 2004. The analysis focused on the relationship between occupational coursetaking and mathematics outcomes. Fixed effects regression techniques were used to control for unobserved characteristics of sample members which might influence both their occupational coursetaking and their mathematics coursetaking; in this way, the background-independent effects of occupational coursetaking on math achievement could be estimated. The following discussion of fixed effects regression repeats the appendix discussion of fixed effects regression models in Bozick and Dalton.

In conventional OLS (ordinary least squares) and conditional change regression models, control variables can be used to remove the effect of potentially confounding observed variables. However, if there are unobserved characteristics that are correlated with the key predictor variables and the outcome net of the observed controls, the estimated effects of the key predictor variables will be biased. Unlike OLS and conditional change regression models, fixed-effects regression absorbs both observed and unobserved potentially confounding time-invariant characteristics, and therefore provides the best linear unbiased estimate of the key predictor variables. In a fixed-effects model, these time-invariant characteristics are measured by a fixed constant α_i that differs for each individual *i*. The form of the model used in this analysis is

$$y_{it} = \beta_1 OCC_{it} + \beta_2 ACAD_{it} + \delta_1 \mathbf{X}_{it} + \gamma_1 YEAR_{it} + \alpha_i + \varepsilon_{it}$$

where *y* is the mathematics achievement score for individual *i* at time *t*, *t* = time one interview or time two interview; OCC is the number of occupational credits for individual *i* at time *t*; ACAD is the number of academic credits for individual *i* at time *t*; **X** is a vector of time-varying control variables where time use, orientations toward schooling, and grade retention are measured for individual *i* at time *t*; YEAR is a binary indictor of the survey administration (0 = BY interview; 1 = F1 interview); α_i is a fixed constant that differs for each individual *i*; β_1, β_2, δ_1,and $\gamma_1$are parameters to be estimated; and ε is random error for individual *i* at time *t*. To estimate the model, each individual's mathematics achievement score at each time point can be expressed as a deviation from their mean score at each time point:

$$y_{it} - \overline{y_i} = \beta_1\left(OCC_{it} - \overline{OCC_i}\right) + \beta_2\left(ACAD_{it} - \overline{ACAD_i}\right) + \delta_1\left(\mathbf{X}_{it} - \overline{\mathbf{X}_i}\right) + \gamma_1\left(YEAR_{it} - \overline{YEAR_i}\right) + \left(\varepsilon_{it} - \overline{\varepsilon_i}\right).$$

In this differencing estimator, all time-invariant characteristics (α_i) are eliminated because the difference will always equal zero, thus alleviating the problem of selection bias. Observed time-varying factors contained in **X** remove the confounding effects of time use, orientations toward schooling, and grade retention observed in the data. Any natural growth in mathematics learning overtime is controlled for by the time-varying measure of survey year (YEAR). The resulting estimates of coursetaking (β_1 and β_2) will be unbiased as long as there are

no unobserved time-varying characteristics influencing the relationship between coursetaking and mathematics achievement.

In the following two tables, these methods are applied to a sample from NELS:88 who graduated from public high schools in 1992. Prior ELS:2002 results, as found in Bozick and Dalton, are repeated for comparison. Two mathematics outcomes are analyzed: the overall mathematics test score, and specific probability of proficiency scores that estimate the likelihood a student has mastered progressively more difficult mathematics skills and knowledge. The probability of proficiency scores for NELS:88, however, only measure four distinct levels of proficiency, compared to the five provided in ELS:2002 (a fifth level was added for NELS:88's senior-year assessment, but only four levels were calculated for the sophomore-year assessment; both years are required for fixed effects estimates). Both of these measures, as well as the occupational coursetaking and academic credits measures, are described in the appendix A glossary.

Table C-1 shows the results using a measure of occupational coursetaking (credits earned in any specific labor market preparation area) while controlling for a separate measure of total academic credits earned. Table C-2 shows the results using a measure of the percent of all courses which were occupational. All models use imputed data (except for imputed information on coursetaking) and control for survey year, student time use, orientation to school, grade retention, as well as missing data at either time point. Only the regression coefficients for the main effects are shown here; other coefficients are available upon request.

The NELS:88 results are remarkably similar to the ELS:2002 results. No statistically significant results for total occupational credits earned (controlling separately for academic credits earned) were observed, though ELS:2002's result for the fifth level of proficiency (not available in NELS:88) was statistically significant. Similarly, the percent of all courses that were occupational was associated with lower overall math test scores and less proficiency at level four, though no association was observed at lower proficiency levels. The brief conclusion that can be drawn from this extension to NELS:88 is that the effects of occupational coursetaking on mathematics achievement have been exceptionally stable between 1992 and 2004.

Appendix C Reference

Bozick, R., and Dalton, B. (2013). *Career and Technical Education and Academic Progress at the End of High School: Evidence from the Education Longitudinal Study of 2002*. U.S. Department of Education, Policy and Program Studies Service. Washington, DC.

Table C-1. Fixed effects estimates of the effect of total academic and total occupational courses on math achievement

	IRT	Proficiency Probability Scores				
	Number-Right	Level 1	Level 2	Level 3	Level 4	Level 5
NELS:88 estimates						
Total Occupational	-.023	.001	.006	.003	-.001	—
Courses	(.053)	(.004)	(.004)	(.005)	(.003)	
Total Academic	.23 **	-.005 *	-.001	.005	.015 **	—
Courses	(.034)	(.002)	(.003)	(.003)	(.015)	
N=13,370						
ELS:2002 estimates						
Total Occupational	-.096	-.001	.001	-.001	-.004	-.001 *
Courses	(.097)	(.002)	(.003)	(.006)	(.004)	(.000)
Total Academic	.348 **	-.003 **	-.002	.004 **	.015 **	.009 **
Courses	(.038)	(.001)	(.002)	(.000)	(.001)	(.001)
N = 7,160						

— Not available

* $p < .05$

** $p < .01$

NOTE: Numbers in parentheses are standard errors. All models include controls for survey year, student time use, orientation toward school, grade retention, and missing data.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Table C-2. Fixed effects estimates of the effect of the percent of courses that are occupational on math achievement

	IRT	Proficiency Probability Scores				
	Number-Right	Level 1	Level 2	Level 3	Level 4	Level 5
NELS:88 estimates						
% Occupational	-.053 **	.001	.001	-.001	-.003 **	—
courses	(.011)	(.001)	(.001)	(.001)	(.001)	—
N=13,370						
ELS:2002 estimates						
% Occupational	-.001 **	.001	.001	-.0004	-.0003 **	-.0001 **
courses	(.000)	(.000)	(.000)	(.000)	(.000)	(.000)
N = 7,160						

— Not available

* $p < .05$

** $p < .01$

NOTE: Numbers in parentheses are standard errors. All models include controls for survey year, student time use, orientation toward school, grade retention, and missing data.

SOURCE: U.S. Department of Education, National Center for Education Statistics, National Education Longitudinal Study of 1988 (NELS:88), "Second Follow-up, Transcript Survey, 1992"; and Education Longitudinal Study of 2002 (ELS:2002), "First Follow-up, High School Transcript Study, 2004."

Appendix D. CSSC Codes and Titles for Coursetaking Subjects and Areas

This appendix presents the lists of codes and standardized course titles from the Classification of Secondary School Courses (CSSC), arranged in the taxonomy used in this report. Though the CSSC code order involves course groupings, there are a variety of additional ways courses can be grouped. In the current analysis, the organization of CTE courses is based on the 2008 revision of the CTE portion of the Secondary School Taxonomy (SST) (Bradby and Hudson 2008). We further revise the organization of specific labor market courses (i.e., occupational area courses) to collapse some categories and separate others (compare Bradby and Hudson 2008, p. 11). The groupings of academic subject courses are based on the 1998 revision of the SST (Bradby and Hoachlander 1999), updated to reflect additional courses identified as part of the ELS:2002 high school transcript study and documented in Bozick et al. (2006). Courses that were identified on the transcripts as having been taken while the student was in grade 8 or below, which were ungraded, or in which zero credit was earned were not included in credit counts created from these lists. In addition, some course titles may be listed twice because they were renumbered in subsequent CSSC updates but maintain the old numbering in HS&B and NELS:88.

Courses are divided into three areas: academic subject courses, career and technical education (CTE) courses, and enrichment/other courses. CTE courses are further grouped into family and consumer sciences education (FCSE) courses, general labor market preparation (GLMP) courses, and specific labor market preparation/occupational area courses. The occupational area courses are organized into 11 areas that reflect occupational career clusters as seen from the perspective of postsecondary work and schooling. These 11 areas are: agriculture and natural resources; architecture, construction, and science technology; business; communications and design; computer and information science; consumer and culinary services; engineering technologies; health sciences; manufacturing, repair, and transportation; marketing; and public services.

Appendix D References:

Bozick, R., Lytle, T., Siegel, P.H., Ingels, S.J., Rogers, J.E., Lauff, E., and Planty, M. (2006). *Education Longitudinal Study of 2002: First Follow-Up Transcript Component Data File Documentation* (NCES 2006-338) [restricted use]. National Center for Education Statistics, Institute for Education Sciences, U.S. Department of Education. Washington, DC.

Bradby, D., and Hudson, L. (2008). *The 2007 Revision of the Career/Technical Education Portion of the Secondary School Taxonomy* (NCES 2008-030). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC.

Bradby, D., and Hoachlander, G. (1999). *1998 Revision of the Secondary School Taxonomy* (NCES 1999-06). National Center for Education Statistics, U.S. Department of Education. Washington, DC.

NOTE: In the following lists, courses that do not appear on any of the three transcript files (HS&B, NELS:88, nor ELS:2002) but which are identified in Bradby and Hoachlander (1999) are marked with *.

Academic Subject Courses

English

070411 Business English 1
070412 Business English 2
070413 Business English 3
070414 Business English 4
090400 Journalism (Mass Communications), Other
090411 Journalism 1
090412 Journalism 2
090413 Journalism 3
090421 Journalism Investigations
090431 Literary Magazine
160121 English as a Second Language 1
160122 English as a Second Language 2
160123 English as a Second Language 3
160124 English as a Second Language, Skills Lab
160125 Transitional English
230100 English, Other General
230101 English 7
230102 English 7, Honors
230103 English 8, Below Grade Level
230104 English 8
230105 English 8, Honors
230106 English 1, Below Grade Level
230107 English 1
230108 English 1, Honors
230109 English 2, Below Grade Level
230110 English 2
230111 English 2, Honors
230112 English 3, Below Grade Level
230113 English 3
230114 English 3, Honors
230115 English 4, Below Grade Level
230116 English 4
230117 English 4, Honors
230118 World Literature
230119 Renaissance Literature
230120 Romanticism
230121 Realism
230122 Literature, Contemporary
230123 Irish Literature
230124 Russian Literature
230125 Bible as Literature
230126 Mythology and Fable
230127 Drama, Introduction
230128 World Drama
230129 Plays, Modern Survey
230130 Novels
230131 Short Story
230132 Mysteries
230133 Poetry
230134 Rock Poetry
230135 Humor
230136 Biography
230137 Non Fiction
230138 Science Fiction
230139 Themes in Literature
230140 Literature of Human Values
230141 Ethnic Literature
230142 Women in Literature
230143 Sports through Literature
230144 Occult Literature
230145 Protest Literature
230146 Youth and Literature
230147 Heroes
230148 Utopias
230149 Death
230150 Nobel Prize Authors
230151 Seminar on an Author
230152 English, Real Life Problem Solving
230153 Reading, Independent Study
230154 Research Technique
230155 Children's Literature & Fantasy
230156 Vocational English
230161 Pre-IB English 1 (grade 9)
230162 Pre-IB English 2 (grade 10)
230163 Pre-IB English 3 (grade 11)
230164 IB English 4 (grade 11 or 12)
230165 IB English 5 (grade 12)
230166 AP Language and Composition
230167 AP Literature and Composition
230168 *
230169 *
230170 *
230171 English 1/History
230172 English 2/History
230173 English 3/History
230200 Classics, Other
230211 Mythological Literature, Greek and Roman
230300 Comparative Literature, Other
230311 Comparative Literature
230321 Latin American Authors/Literature
230400 Composition, Other
230401 Composition, Expository
230402 Writing Laboratory

230403 Writing About Literature
230404 Vocabulary
230405 Spelling
230406 Grammar 7
230407 Grammar 8
230408 Grammar 9
230409 Grammar 10
230410 Grammar 11
230411 Grammar 12
230412 Etymology
230415 Word Study - Remedial
230500 Creative Writing, Other
230511 Creative Writing 10
230512 Creative Writing 11
230513 Creative Writing 12
230521 Creative Writing, Independent Study
230600 Linguistics (includes Phonetics, Semantics,
230611 Linguistics
230700 Literature, American, Other
230711 American Literature
230721 Black Literature
230731 American Dream in Literature
230741 Folklore, American
230751 Indian Literature
230761 State Writers
230771 Western Literature
230781 Mexican American Literature
230800 Literature, English, Other
230811 British Literature Survey
230821 Shakespeare
230831 Modern British Writer
230841 Victorian Literature
230851 Satire, Modern British
230861 Arthurian Legend
230871 Medieval Literature
230900 Rhetoric, Other
231000 Speech, Debate, and Forensics, Other
231011 Public Speaking
231021 Speech 1
231022 Speech 2
231023 Speech 3
231031 Debate Practicum Contract
231100 Technical and Business Writing, Other
231111 Technical English
231211 Reading Development 1
231212 Reading Development 2
231213 Reading Development 3
231214 Reading Development 4
231216 Advanced Reading and Study Skills
231311 Functional English 1
231312 Functional English 2
231313 Functional English 3
231314 Functional English 4
239900 Letters/English, Other
320109 Developmental, various
320110 Developmental, various
320112 Developmental, various
320113 Developmental, various
320114 Developmental, various
320115 Developmental, various
320118 Developmental, various
520103 English/Language Arts EMH
520203 English/Language Arts EH
520301 English/Language Arts DEAF
542011 Functional Language Arts
542019 Functional Language Arts 1, not for credit
542021 Functional Language Arts 2
542029 Functional Language Arts 2, not for credit
542031 Functional Language Arts 3
542039 Functional Language Arts 3, not for credit
542041 Functional Language Arts 4
542049 Functional Language Arts 4, not for credit
542050
542051 Functional Vocational English
542059 Functional Vocational English, not for credit
542101 Functional Reading
542109 Functional Reading, not for credit
542201 Functional Oral Communication
542209 Functional Oral Communication, not for credit
542301 Functional Writing
542309 Functional Writing, not for credit
562300 Special Education Language Arts
562301 Resource Language Arts/English
562302 Developmental English 2/Resource ESE AAP
562303 Developmental English 3/Resource ESE AAP
562304 Developmental English 4/Resource ESE AAP
562309 Developmental English 4/Resource ESE AAP
562310 Special Education Reading
562311 Resource Writing
562319 Resource Reading, not taken for credit
562320 Special Education Writing
562321 Resource Writing
562322 Resource Room English 2 (Special Education)
562329 Resource Writing, not for credit

Mathematics

010151 Agricultural Mathematics
070171 Business Mathematics 1
070172 Business Mathematics 2
070221 Financial Mathematics

170651 Nurse's Mathematics
270100 Mathematics, Other General
270101 Mathematics 7
270102 Mathematics 7, Accelerate
270103 Mathematics 8
270104 Mathematics 8, Accelerated
270105 Competency/Basic/Review Math
270106 Mathematics 1, General
270107 Mathematics 2, General
270108 Science Mathematics
270109 Mathematics in the Arts
270110 Mathematics, Vocational
270111 Technical Mathematics
270112 Mathematics Review
270113 Mathematics Tutoring
270114 Consumer Mathematics
270200 Actuarial Sciences, Other
270300 Applied Mathematics, Other
270400 Pure Mathematics, Other
270401 Pre-Algebra
270402 Algebra 1, Part 1
270403 Algebra 1, Part 2
270404 Algebra 1
270405 Algebra 2
270406 Geometry, Plane
270407 Geometry, Solid
270408 Geometry
270409 Geometry, Informal
270410 Algebra 3
270411 Trigonometry
270412 Analytic Geometry
270413 Trigonometry and Solid Geometry
270414 Algebra and Trigonometry
270415 Algebra and Analytic Geometry
270416 Analysis, Introductory
270417 Linear Algebra
270418 Calculus and Analytic Geometry
270419 Calculus
270420 AP Calculus
270421 Mathematics 1, Unified
270422 Mathematics 2, Unified
270423 Mathematics 3, Unified
270424 Mathematics, Independent Study
270425 Geometry, Part 1
270426 Geometry, Part 2
270427 Unified Math 1, Part 1
270428 Unified Math 1, Part 2
270429 Pre-IB Geometry
270430 Pre-IB Algebra 2/Trigonomery
270431 IB Math Methods 1
270432 IB Math Studies 1
270433 IB Math Studies 2
270434 IB Math Studies/Calculus
270435 AP Calculus CD
270436 Discrete Math
270437 Finite Math
270441 Algebra and Geometry
270500 Statistics, Other
270511 Statistics
270521 Probability
270531 Probability and Statistics
270532 AP Statistics
270601 Basic Math 1
270602 Basic Math 2
270603 Basic Math 3
270604 Basic Math 4
279900 Mathematics, Other
541001 General Math Skills
541009 Functional Math Skills, not for credit
541101 Functional Consumer Math
541109 Functional Consumer Math, not for credit
541201 Functional Vocational Math
541209 Functional Vocational Math, not for credit
562700 Special Education Math
562701 Resource General Math
562709 Resource General Math, not for credit
562711 Resource Vocational Math
562719 Resource Vocational Math, not for credit
562721 Resource Consumer Math
562729 Resource Consumer Math, not for credit
320108 Math for Employment
520102 Math EMH
520204 Math EH
520302 Math DEAF

Science

140100 Engineering, Other General
140111 Orientation to Engineering
140200 Aerospace, Aeronautical, and Astronautical
140211 Aerospace Materials
140221 Aerospace Engineering Design
140300 Agricultural Engineering, Other
140400 Architectural Engineering, Other
140411 Strength of Materials - Architectural
140500 Bioengineering and Biomedical Engineering,
140600 Ceramic Engineering, Other
140700 Chemical Engineering, Other
140800 Civil Engineering, Other
140900 Computer Engineering, Other
141000 Electrical, Electronics and Communications
141100 Engineering Mechanics, Other
141200 Engineering Related, Other
141211 Instrumentation Physics 1
141212 Instrumentation Physics 2
141213 Instrumentation Physics 3
141214 Instrumentation Physics 4 /Advanced
141300 Engineering Science, Other

141400 Environmental Health Engineering, Other
141500 Geological Engineering, Other
141600 Geophysical Engineering, Other
141700 Industrial Engineering, Other
141800 Materials, Engineering, Other
141900 Mechanical Engineering, Other
141911 Strength of Materials, Mechanical Technology
142000 Metallurgical Engineering, Other
142011 Metallurgy/Powder Metal Basics
142100 Mining and Mineral Engineering, Other
142200 Naval Architecture and Marine Engineering,
142300 Nuclear Engineering, Other
142400 Ocean Engineering, Other
142500 Petroleum Engineering, Other
142600 Surveying and Mapping Sciences, Other
142611 Cartography
142700 Systems Engineering, Other
142800 Textile Engineering, Other
149900 Engineering, Other
182501 Bio-Medical Technology, General
260100 Biology, Other General
260111 Science 7
260121 Biology, Basic 1
260122 Biology, Basic 2
260131 Biology, General 1
260132 Biology, General 2
260141 Biology, Honors 1
260142 Biology, Advanced
260143 Pre-IB Biology
260144 IB Biology 2
260145 IB Biology 3
260146 AP Biology
260151 Field Biology
260161 Genetics
260171 Biopsychology
260181 Biology Seminar
260200 Biochemistry and Biophysics, Other
260211 Biochemistry
260300 Botany, Other
260311 Botany
260400 Cell and Molecular Biology, Other
260411 Cell Biology
260500 Microbiology, Other
260511 Microbiology
260600 Miscellaneous Specialized Areas, Life
260611 Ecology
260621 Marine Biology
260622 Marine Biology, Advanced
260631 Anatomy
260700 Zoology, Other
260711 Zoology
260721 Zoology, Vertebrate
260731 Zoology, Invertebrate
260741 Animal Behavior
260751 Physiology, Human
260752 Physiology, Advanced
260761 Pathology
260771 Comparative Embryology
269900 Life Sciences, Other
300100 Biological and Physical Sciences, Other
300111 Science, Unified
300112 College Pre-Science Skills
300121 Science Study, Independent
300300 Engineering and Other Disciplines, Other
300311 Engineering Concepts
300621 Environmental Science
300623 IB Environmental Studies
300631 Energy and Environment
400100 Physical Sciences, Other General
400111 Science 8
400121 Physical Science
400131 Chemistry and Physics Laboratory Techniques
400141 Physical Science, Applied
400200 Astronomy, Other
400211 Astronomy
400300 Astrophysics, Other
400400 Atmospheric Sciences and Meteorology, Other
400411 Meteorology
400500 Chemistry, Other
400511 Chemistry, Introductory
400512 Chemistry in the Community
400521 Chemistry 1
400522 Chemistry 2
400523 Pre-IB Chemistry 1
400524 IB Chemistry 2
400525 IB Chemistry 3
400526 AP Chemistry
400531 Organic Chemistry
400541 Physical Chemistry
400551 Consumer Chemistry
400561 Chemistry, Independent Study
400600 Geological Sciences, Other
400611 Earth Science
400621 Earth Science, College Preparatory
400622 AP Environmental Science
400631 Geology
400632 Geology - Field Studies
400641 Mineralogy
400700 Miscellaneous Physical Sciences, Other
400711 Oceanography
400800 Physics, Other
400811 Physics, General
400812 Principles of Technology 1
400813 Principles of Technology 2
400821 Physics 1
400822 Physics 2

400823 IB Physics
400824 AP Physics B
400825 AP Physics C: Mechanics
400826 AP Physics C: Electricity/Magnetism
400831 Physics 2 without Calculus
400841 Electricity and Electronics Science
400851 Acoustics
400900 Planetary Science, Other
400911 Rocketry and Space Science
401011 Aerospace Science
409900 Physical Sciences, Other
410211 Radioactivity
544001 Functional Science
544009 Functional Science, not for credit
564000 Special Education General Science
564001 Resource General Science
564009 Resource General Science, not for credit
520104 Science EMH
520205 Science EH
520303 Science DEAF

Social Studies

050100 Area Studies, Other
050101 Area Studies
050102 American Studies, Basic
050103 American Studies, General
050104 America's People and Problems
050105 American Studies, Honors
050106 New England Studies
050107 Old South
050108 American West
050109 Southwest United States
050110 Anglo America
050111 North America and Current Events
050112 North and South America
050113 Latin America
050114 World Studies 1
050115 World Studies 2
050116 World Studies, Honors
050117 Comparative World Cultures
050118 European Culture Studies, Basic
050119 European Culture Studies, General
050120 European Culture Studies, Honors
050121 Developing Nations
050122 African Area Studies
050123 Africa and South America
050124 Asian and African Cultural Studies, Basic
050125 Asian and African Cultural Studies, General
050126 Asian and African Cultural Studies, Honors
050127 Asian Studies
050128 History of China
050129 Asia, Africa and Mideast
050130 Africa and Middle East
050131 Middle Eastern Studies
050132 Middle East, War for Survival
050133 USSR
050134 Soviet Union and China
050135 Soviet Union and Afro American Developing
050136 History of Russia
050137 Neglected World
050138 Global Education
050139 Pacific Rim Nations
050140 Canadian Area Studies
050200 Ethnic Studies, Other
050211 Minorities in America
050221 Ethnic and Family Heritage
050231 Afro American Studies
050241 Economics of Afro Americans
050251 Indians of North America
050261 Jewish Historical Significance
050271 Mexican American Heritage
050281 Hawaiiana
050291 Hawaiian Culture Studies, Modern
059900 Area and Ethnic Studies, Other
090121 Intercultural Communications
090500 Public Relations, Other
220100 Law, Other
220111 Law Fundamentals
220121 Law and You
220131 Street Law
230171 English 1/History
230172 English 2/History
230173 English 3/History
240100 Liberal/General Studies, Other
240111 Liberal Studies
300400 Humanities and Social Sciences, Other
300411 Humanities
300421 Humanities, European
300431 Humanities, American
300441 Humanities, African
300451 Humanities, Near East and Far East
300500 Peace Studies, Other
300600 Systems Science, Other
300611 Futuristics
300700 Women's Studies, Other
300711 Women's Studies
300721 Women's Studies in Literature
309900 Multi/Interdisciplinary Studies, Other
320119 Contemporary Issues, Basic Skills
330161 U.S. History, Remedial
380100 Philosophy, Other
380111 Philosophy
380121 Ethics
380131 Logic
380141 Epistemics
380142 IB Theory of Knowledge
380151 Social Justice Issues
420100 Psychology, Other General

420111 Psychology
420112 Psychology, Advanced
420113 Abnormal Psychology
420114 AP Psychology
420115 IB Psychology
420200 Clinical Psychology, Other
420300 Cognitive Psychology, Other
420311 Psychology of Learning
420321 Educational Psychology
420400 Community Psychology, Other
420500 Comparative Psychology, Other
420600 Counseling Psychology, Other
420700 Developmental Psychology, Other
420711 Child Psychology
420721 Adolescent Psychology
420731 Adjustment Psychology
420800 Experimental Psychology, Other
420900 Industrial and Organizational Psychology,
421000 Personality Psychology, Other
421011 Historical Personalities and Ideas
421021 Humanistic Psychology
421100 Physiological Psychology, Other
421200 Psycholinguistics, Other
421300 Psychometrics, Other
421400 Psychopharmacology, Other
421411 Psychopharmacology
421500 Quantitative Psychology, Other
421600 Social Psychology, Other
421611 Social Psychology
429900 Psychology, Other
440300 International Public Service, Other
450100 Social Sciences, Other General
450111 Social Science, Introduction
450121 Social Science, Advanced Theory and
450131 Social Science Seminar
450141 Social Studies, Independent Study
450200 Anthropology, Other
450211 Anthropology
450221 Comparative Cultural Patterns
450231 Anthropology, Myth and Magic
450241 Cultural Anthropology, Research
450300 Archaeology, Other
450311 Archaeology
450500 Demography, Other
450511 Population Education
450600 Economics, Other
450601 Economics, Theory
450602 Economics and Economic Problems
450603 Consumer Economics
450605 Insurance Theory
450606 Investment Economics
450607 Television and Economics
450608 Energy Education
450609 American Labor History
450610 Economics, Analysis and Criticism
450611 Economics, College
450612 International Economics
450613 AP Economics; AP Microeconomics
450614 AP Macroeconomics
450615 IB Microeconomics
450616 IB Macroeconomics
450700 Geography, Other
450701 Geography 8
450702 Geography, United States
450703 Geography, North American
450704 World Geography
450705 Geography, Western Hemisphere and Africa
450706 Geography, Eastern Hemisphere
450707 Physical Geography
450708 Economic and Political Geography
450709 Human and Cultural Geography
450710 Field Geography, Honors
450711 IB World Geography
450712 AP Human Geography
450800 History, Other
450801 History and Geography 7
450802 Our Cultural Heritage 7
450803 Social Studies 7, Honors
450804 United States History 8
450805 Social Studies 8
450806 Social Studies 8, Honors
450807 United States History, State and Local
450808 United States History, Advanced Placement
450809 American History, Basic
450810 American History
450811 United States History 1
450812 United States History 2
450813 United States History, Honors
450814 American History, Advanced Placement
450815 Westward Movement
450816 Twentieth Century America
450817 Twenties and Thirties
450818 America Since 1945
450819 Nineteen Sixties
450820 Nineteen Seventies
450821 Reform in American History
450822 American Inquiries
450823 Historic Events, United States
450824 American Wars, Causes and Effects
450825 Civil War
450826 Civil War, Reconstruction and Industrialism
450827 War and Modern Consciousness
450828 World War II
450829 United States Military History 1
450830 United States Military History 2
450831 United States History, Field Study
450832 North American History
450833 Mexican History

450834 South American History
450835 World History
450836 World History, College
450837 World History, Modern
450838 World Civilization, 20th Century
450839 World Civilization, 20th Century, Honors
450840 Western Civilization 9
450841 Western Civilization 9, Honors
450842 Western Civilization, History
450843 Early Western Civilization
450844 World History, Advanced
450845 Ancient and Classical World
450846 Ancient Greek History
450847 Rome and Her Empire
450848 Ancient History and Middle Ages
450849 English History
450850 English History, Honors
450851 French Revolution, Honors
450852 Modern Europe
450853 European History, Mid-19th Through Mid-
450854 European History, 20th Century
450855 European History, Advanced Readings
450856 European History, Modern
450857 Third World History
450858 African History
450859 Africa, Middle East and Latin America
450860 Latin American History
450861 Middle East History
450862 Israel, History
450863 Eastern Civilization
450864 Far East, History
450865 Asian History, Modern
450866 Pacific Lands, History
450867 Russian History
450868 World Leaders, Past and Present
450869 Historical Research
450870 Pre-IB World History
450871 IB History Of The Americans
450872 IB Twentieth Century World Topics
450873 IB History of Europe
450874 Pre-IB US History
450875 AP World History
450881 The Holocaust
450900 International Relations, Other
450911 International Relations
450921 International Relations, Honors
450931 International Law
450941 Model Security Council, Local
450951 Model United Nations, Local
450952 Model United Nations, National
451000 Political Science and Government, Other
451001 Civics
451002 State and Local Government
451003 Government, Basic
451004 American Government
451005 Presidency
451006 Framework of the Constitution
451007 Individual vs. State
451008 National State and Local Elections
451009 Elections, Politics and Morality, Honors
451010 Contemporary World Affairs
451011 American Foreign Policy
451012 Decision Making in a Crisis
451013 American Heritage, Honors
451014 Contemporary American Political Issues
451015 Contemporary American Political Issues, Honors
451016 American Government and Economics, Basic
451017 American Government and Economics
451018 American Government and Economics, Honors
451019 Comparative Political Systems, Basic
451020 Comparative World Governments
451021 Americanism vs. Communism
451022 Americanism vs. Communism, Honors
451023 Communism and Its Growth
451024 Civics, Honors
451025 Writings Influencing Government
451026 Government Internship
451027 Model Senate
451028 Political Leadership
451029 Political Science
451030 Political Science, Advanced Placement
451031 Political Science and Government -
451032 Political Turmoil
451033 Contemporary Issues, Basic Skills
451034 Pre-IB American Government/Economics
451035 AP American Government and Politics
451036 AP Comparative Government and Politics
451037 IB American Government
451100 Sociology, Other
451111 American Social Problems, Introduction
451121 Sociology, General
451131 Sociology, Issues
451132 The Poor in America
451141 Mobility in Society
451151 Violence In America
451161 Death and Dying
451171 Sociology, Honors
451181 Sociology, Research
451191 *
451200 Urban Studies, Other
451211 Urban Problems
451221 Urban Ecology
451231 Technology and Urbanization
459900 Social Sciences, Other
564500 Special Education Social Studies

564501 Resource Social Studies
564509 Resource Social Studies, not for credit
452035 *
452103 *
520105 Social Studies EMH
520206 Social Studies EH
520304 Social Studies DEAF

Fine Arts

500100 Visual and Performing Arts, Other General
500111 Aesthetics
500200 Crafts, Other
500211 Crafts 7
500212 Crafts 8
500213 Crafts 9
500214 Crafts 10
500215 Crafts 11
500216 Crafts 12
500221 Crafts 11, Advanced
500222 Crafts 12, Advanced
500231 Decorator Crafts
500241 Enameling
500251 Jewelry 1
500252 Jewelry 2
500253 Jewelry 3
500254 Jewelry 4
500261 Ceramics 7
500262 Ceramics 8
500263 Ceramics 9
500264 Ceramics 10
500265 Ceramics 11
500266 Ceramics 12
500271 Textile Design
500281 Model Building
500291 Printmaking 1
500292 Printmaking 2
500300 Dance, Other
500311 Modern Dance for Beginners 9
500312 Modern Dance for Beginners 10
500313 Modern Dance for Beginners 11
500314 Modern Dance for Beginners 12
500321 Modern Dance 9, Intermediate
500322 Modern Dance 10, Intermediate
500323 Modern Dance 11, Intermediate
500324 Modern Dance 12, Intermediate
500331 Dance 9, Advanced
500332 Dance 10, Advanced
500333 Dance 11, Advanced
500334 Dance 12, Advanced
500335 Advanced Dance IB
500341 Performing Dance Group 9
500342 Performing Dance Group 10
500343 Performing Dance Group 11
500344 Performing Dance Group 12
500351 Ballet and Jazz for Beginners 9
500352 Ballet and Jazz for Beginners 10
500353 Ballet and Jazz for Beginners 11
500354 Ballet and Jazz for Beginners 12
500361 Ethnic Dance
500371 Square Dance
500381 Aerobic Dance
500421 Theater Makeup
500431 Lighting Fundamentals, Theater
500500 Dramatic Arts, Other
500511 Stagecraft 9
500512 Stagecraft 10
500513 Stagecraft 11
500514 Stagecraft 12
500521 Improvisation and Mime
500531 Playwriting
500541 Theater Practicum Contract
500551 Drama, History
500561 Drama, Independent Study
500600 Film Arts, Other
500600 Film Arts, Other
500611 Film Study
500612 Language of the Cinema
500621 Photography 10
500622 Photography 11, Elementary
500623 Photography 12, Elementary
500631 Photography 11, Advanced
500632 Photography 12, Advanced
500700 Fine Arts, Other
500701 Fine Arts 7
500702 Fine Arts 8
500703 Art, General
500704 Art 1
500705 Art 2
500706 Art 3
500707 Art 4
500708 Art 1, Independent Study
500709 Art 2, Independent Study
500711 Art Services 10
500712 Art Services 11
500713 Art Services 12
500714 Drawing
500715 Painting 1
500716 Painting 2
500717 Watercolor 1
500718 Cartooning
500719 Mural Painting
500720 Sculpture
500721 Silk Screen
500722 Assemblage
500723 Product Design
500724 Life Drawing
500725 Calligraphy
500726 Art History and Appreciation
500727 Black Fine Arts
500728 Mexico, Fine Arts
500729 Bicultural Art

500730 Artist in Residence Program
500731 Ethnic Art History
500732 Art As A Multicultural Study
500733 AP Art History
500734 AP Studio Art/General
500735 AP Studio Art/Drawing
500736 IB Art Studies
500737 IB Art Studio
500738 *
500739 *
500900 Music, Other
500901 Music 7
500902 Music 8
500903 Band 7
500904 Band 7, Advanced
500905 Band 8
500906 Band 8, Advanced
500907 Band 9
500908 Band 9, Advanced
500909 Band, Concert
500910 Band, Marching
500911 Band, Symphonic
500912 Orchestra 7
500913 Orchestra 7, Advanced
500914 Orchestra 8
500915 Orchestra 8, Advanced
500916 Orchestra 9
500917 Orchestra 9, Advanced
500918 Orchestra 10
500919 Orchestra 11
500920 Orchestra 12
500921 Instrumental String Class
500922 Brass and Percussion Class
500923 Wind Ensemble
500924 Woodwind Class
500925 Electronic Music, Introduction
500926 Ensemble, Instrumental
500927 Guitar, Beginning
500928 Guitar, Intermediate
500929 Guitar, Advanced
500930 Handbells
500931 Piano 1
500932 Piano 2
500933 Organ
500934 Music Lessons, Applied
500935 Chorus 7
500936 Chorus 7, Advanced
500937 Chorus 8
500938 Chorus 8, Advanced
500939 Chorus 9
500940 Chorus 9, Advanced
500941 Chorus 10
500942 Chorus 10, Advanced
500943 Chorus 11
500944 Chorus 11, Advanced
500945 Chorus 12
500946 Chorus 12, Advanced
500947 Vocal Ensemble
500948 Voice Class
500949 Harmony and Composition
500950 Arranging
500951 Conducting
500952 Music Theory
500953 Music History 7
500954 Music History 8
500955 Music History 9
500956 Music History 10
500957 Music History 11
500958 Music History 12
500959 Music Literature 9
500960 Music Literature 10
500961 Music Literature 11
500962 Music Literature 12
500963 Music Appreciation
500964 Folk Music, Ethnic
500965 Music Theater
500966 Music, Independent Study
500967 Music Laboratory, General Survey
500968 IB Music
500969 AP Music Theory
509900 Visual and Performing Arts, Other

Non-English (Foreign) Language

90811 Sign Language 1
90812 Sign Language 2
90813 Sign Language 3
90821 Braille Communications
160200 African (Non-Semitic) Languages, Other
160211 Swahili 1
160212 Swahili 2
160221 Amharic 1 (Ethiopian)
160222 Amharic 2 (Ethiopian)
160300 Asiatic Languages, Other
160311 Cantonese 1
160312 Cantonese 2
160313 Cantonese 3
160314 Cantonese 4
160321 Mandarin 1
160322 Mandarin 2
160323 Mandarin 3
160324 Mandarin 4
160325 Mandarin 5
160326 IB Chinese
160331 Japanese 1
160332 Japanese 2
160333 Japanese 3
160334 Japanese 4
160335 Japanese 5
160336 Foreign Language Contract, Japanese
160337 IB Japanese 4
160338 IB Japanese 5

160341 Hawaiian 1
160342 Hawaiian 2
160343 Hawaiian 3
160344 Hawaiian 4
160345 Hawaiian Language and Culture
160351 Korean 1
160352 Korean 2
160353 Korean 3
160354 Korean 4
160355 Korean 5
160400 Balto-Slavic Languages, Other
160411 Ukrainian 1
160421 Russian 1
160422 Russian 2
160423 Russian 3
160424 Russian 4
160425 Russian 5
160426 Russian 6
160427 Foreign Language Contract, Russian
160431 Czech 1
160432 Czech 2
160433 Czech 3
160441 Polish 1
160442 Polish 2
160443 Polish 3
160444 Polish 4
160451 Finnish 1
160452 Finnish 2
160453 Finnish 3
160454 Finnish 4
160501 Dutch 1
160502 Dutch 2
160503 Dutch 3
160500 Germanic Languages, Other
160511 German 7
160512 German 8
160513 German 1
160514 German 2
160515 German 3
160516 German 4
160517 German 5
160518 German Field-Based Experience
160519 Foreign Language Contract, German
160544 IB German 4
160545 IB German 5
160546 AP German Language
160521 Norwegian 1
160522 Norwegian 2
160531 Swedish 1
160532 Swedish 2
160533 Swedish 3
160541 Yiddish 1
160542 Yiddish 2
160543 Yiddish 3
160600 Greek, Other
160611 Modern Greek for Survival
160621 Modern Greek
160622 Modern Greek 2
160623 Modern Greek 3
160624 Modern Greek 4
160631 Classical Greek 1
160632 Classical Greek 2
160633 Classical Greek 3
160634 Classical Greek 4
160700 Indic Languages, Other
160800 Iranian Languages, Other
160901 French 7
160902 French 8
160903 French 1
160904 French 2
160905 French 3
160906 French 4
160907 French 5
160908 French Field-Based Experience
160909 Foreign Language Contract, French
160910 French, Conversational
160943 IB French Language
160944 IB French Literature
160948 AP French Language
160949 AP French Literature
160900 Italic Languages, Other
160911 Italian 7
160912 Italian 8
160913 Italian 1
160914 Italian 2
160915 Italian 3
160916 Italian 4
160917 Italian, Advanced Placement
160918 Italian Field-Based Experience
160919 Foreign Language Contract, Italian
160920 Latin 1
160921 Latin 2
160922 Latin 3
160923 Latin 4
160924 Latin 5
160925 Foreign Language Contract, Latin
160947 AP Latin
160952 IB Latin
160926 Portuguese 1
160927 Portuguese 2
160928 Portuguese 3
160929 Portuguese 4
160930 Portuguese 5
161000 Native American Languages, Other
160931 Spanish 7
160932 Spanish 8
160933 Spanish 1
160934 Spanish 2
160935 Spanish 3
160936 Spanish 4
160937 Spanish 5

160938 Spanish Field-Based Experience Spanish Seminar
160939 Foreign Language Contract, Spanish
160941 Spanish for Travelers
160942 Spanish, Commercial Spanish, Job Related
160945 IB Spanish 4
160946 IB Spanish 5
160950 AP Spanish Language
160951 AP Spanish Literature
161100 Semitic Languages, Other
161111 Hebrew 1
161112 Hebrew 2
161113 Hebrew 3
161114 Hebrew 4
161115 Arabic 1
161116 Arabic 2
161117 Arabic 3
161118 Arabic 4
161119 Foreign Language Contract - Arabic
161211 Turkish 1
161212 Turkish 2
161300 Non-English Languages for Native Speaker, Other
161311 Spanish for Native Speakers 1
161312 Spanish for Native Speakers 2
161313 Spanish for Native Speakers 3
161314 Spanish for Native Speakers 4
161315 Spanish for Native Speakers 5/Advanced Placement
161321 Portuguese for Native Speakers 1
161322 Portuguese for Native Speakers 2
161323 Portuguese for Native Speakers 3
161324 Portuguese for Native Speakers 4
161331 Italian for Native Speakers 1
161332 Italian for Native Speakers 2
161333 Italian for Native Speakers 3
161341 Japanese for Native Speakers 1
161342 Japanese for Native Speakers 2
161343 Japanese for Native Speakers 3
161351 Chinese for Native Speakers 1
161352 Chinese for Native Speakers 2
161353 Chinese for Native Speakers 3
161361 French for Native Speakers 1
161362 French for Native Speakers 2
161363 French for Native Speakers 3
161364 French for Native Speakers 4
169900 Foreign Languages, Other

Career and Technical Education

Family and Consumer Sciences Education

190100 Home Economics, Other General
190200 Business Home Economics, Other
190300 Family and Community Services, Other
190400 Family/Consumer Resource Management, Other
190500 Food Sciences and Human
190600 Human Environment and Housing, Nutrition, Other
190700 Individual and Family Development, Other
190800 International/Comparative Home Economics, Other
190900 Textiles and Clothing, Other
199900 Home Economics, Other
200100 Consumer and Homemaking Economics, Other Home
200111 Home Economics 7
200112 Home Economics 8
200113 Home Economics 1
200114 Home Economics 2
200115 Home Economics 3
200116 Home Economics 4
200117 Adult Roles and Functions
200118 Comprehensive Consumer and Homemaking Home Economics, Ind. Study
200141 Consumer Education
200142 Consumer Education 2
200171 Family Relations
200172 Marriage Society and Change Lifestyles
200173 Parenthood
200181 Foods and Nutrition 7
200182 Foods and Nutrition 8
200183 Foods 1
200184 Foods 2
200185 Foods 3
200186 Foods 4
200187 International Foods
200191 Home Management 1
200192 Home Management 2
460441 Home Repair, Home Management
470651 Consumer Automotive Care
554011 General Home Economics 1
554019 General Home Economics 1, not for credit
554021 General Home Economics 2
554029 General Home Economics 2, not for credit
554031 General Home Economics 3
554039 General Home Economics 3, not for credit
554211 Clothing and Textiles 1
554219 Clothing and Textiles 1, not for credit
554221 Clothing and Textiles 2
554229 Clothing and Textiles 2, not for credit
554311 Food and Nutrition 1
554319 Food and Nutrition 1, not for credit
554321 Food And Nutrition 2

554329 Food and Nutrition 2, not for credit
554511 Home Economics Work Study 1
554519 Home Economics Work Study 1, not for credit
554521 Home Economics Work Study 2
554529 Home Economics Work Study 2, not for credit

General Labor Market Preparation

070361 Keyboarding
070711 Typewriting 1
070721 Typewriting, Personal
110111 Computer Appreciation/ Literacy/ Introduction
110112 Internet/Web
110152 Multimedia/Desktop Design
110161 Microsoft Office/Computer Applications
210100 Industrial Arts, Other
210101 Industrial Arts 7
210102 Industrial Arts 8
210103 Industrial Arts 1
210104 Industrial Arts 2
210105 Industrial Arts 3
210106 Industrial Arts 4
210107 Industry and Technology
210108 Industrial Production
210109 Industrial Occupations 1 Introduction
210110 Industrial Occupations 2; Industrial Cooperative Training, Advanced
210111 Industrial Cooperative Ed/Internship
210112 ROP Electronics/Machine Tool
210125 Tech Aide/Shop Foreman
210126 IS Tech
210127 Introduction to Technology
320102 Career Preparation
320103 Career Exploration
320104 Work Experience
320105 Work Experience
320106 Cooperative Ed/Work Study
320107 Cooperative Ed 2
320121 Community College Tech/Tech Prep
320131 *
320141 *
510101 Executive Internship
510102 Executive Internship 2
510103 International Careers Internship
520110 Work Program (OJT off campus) EMH
520902 Physically Handicapped Work Program
550001 General Prevocational Preparation
550009 General Prevocational Preparation, not for credit
550101 Career Exploration
550109 Career Exploration, not for credit
550201 General Work-Study/Experience
550209 General Work-Study/Experience, not for credit
550301 General Work Experience
550309 General Work Experience, not for credit
550401 Combined Vocational/Academic Preparation
550409 Combined Vocational/Academic Preparation, (not for credit) 1
555011 General Industrial Arts 1, not for credit
555019 General Industrial Arts 2
555021 General Industrial Arts 2, not for credit
555029 General Industrial Arts 3
555031 General Industrial Arts 3, not for credit
555039 General Industrial Arts
563201 Resource Career Exploration/Pre-Vocational
563209 Resource Career Exploration/Prevocational (not for credit)

Specific Labor Market Preparation (Occupational Areas)

Agriculture and Natural Resources

10100 Agricultural Business and Management, Other
10111 Agribusiness, Introduction
10121 Agricultural Business Operation
10131 Farm and Ranch Management
10141 State and Community Agriculture
10161 Agricultural Microprocessing
10171 Agriculture Cooperatives
10172 Agricultural Cooperative Education 2
10181 Agriculture, Independent Study
10182 SOEP - Supervised Occupational Experience
10200 Agricultural Mechanics, Other
10211 Agricultural Mechanics, General
10212 Agricultural Mechanics 2
10213 Agricultural Mechanics 3
10214 Agricultural Mechanics 4
10221 Welding, Agricultural
10231 Power and Machinery, Agricultural Small
10241 Farm Construction
10251 Electricity and Electronics, Agricultural
10261 Soil and Water Mechanical Practices
10271 Surveying, Agricultural
10300 Agricultural Production, Other
10311 Agricultural Production, General
10312 Agriculture Technology 1
10313 Agriculture Technology 2
10321 Animal Production
10331 Crop Production

10400 Agricultural Products and Processing, Other
10411 Agricultural Products and Processing 1
10412 Agricultural Products and Processing 2
10421 Agricultural Products and Processing -
10500 Agricultural Services and Supplies, Other
10511 Agricultural Supplies Marketing
10600 Horticulture, Other
10611 Horticulture
10621 Floriculture
10631 Landscaping
10632 Landscaping, Advanced
10641 Greenhouse Management
10651 Nursery Operations and Management
10661 Horticulture Power Equipment Operation and
10662 Horticultural Mechanics 2
10671 Turf Management
10681 Fruit and Vegetable Production
10700 International Agriculture, Other
19900 Agribusiness and Agricultural Production,
20100 Agricultural Sciences, Other General
20111 Agricultural Sciences, General
20121 Agricultural Occupations 1
20122 Agricultural Occupations 2
20123 Agricultural Occupations 3
20124 Agricultural Occupations 4
20200 Animal Sciences, Other
20211 Animal Sciences 1
20212 Animal Sciences 2
20221 Livestock 9
20222 Livestock 10
20231 Poultry
20241 Dairy Production
20251 Nutrition and Feeds
20261 Horse Production
20262 Horseshoeing/Farrier Training
20271 Small Animal Production 1
20272 Small Animal Production 2
20281 Fish Production
20300 Food Sciences, Other
20400 Plant Sciences, Other
20411 Agronomy
20421 Ornamental Horticulture 1
20422 Ornamental Horticulture 2
20423 Ornamental Horticulture 3
20500 Soil Sciences, Other
20511 Soil Sciences, General
20521 Fertilizers and Chemicals
29900 Agricultural Sciences, Other
30100 Renewable Natural Resources, Other General
30200 Conservation and Regulation, Other
30211 Conservation and Regulation
30212 Environmental Management 1
30213 Environmental Management 2
30221 Environmental Management - Cooperative
30300 Fishing and Fisheries, Other
30311 Waterman Occupations
30400 Forestry Production and Processing, Other
30500 Forestry and Related Sciences, Other
30511 Forestry Science 1
30512 Forestry Science 2
30521 Forestry Occupations - Work Experience
30600 Wildlife Management, Other
30611 Wildlife Management
30621 Rural Recreation
30711 Marine Management/Oceanography 1
30712 Marine Management/Oceanography 2
39900 Renewable Natural Resources, Other
480400 Precision Food Production, Other
551011 General Agriculture 1
551019 General Agriculture 1, not for credit
551021 General Agriculture 2
551029 General Agriculture 2, not for credit
551031 General Agriculture 3
551039 General Agriculture 3, not for credit
551111 Animal Care 1
551119 Animal Care 1, not for credit
551121 Animal Care 2
551129 Animal Care 2, not for credit
551211 Plant Care 1
551219 Plant Care 1, not for credit
551221 Plant Care 2
551229 Plant Care 2, not for credit
551311 Agricultural Mechanics 1
551319 Agricultural Mechanics 1, not for credit
551321 Agricultural Mechanics 2
551329 Agricultural Mechanics 2, not for credit
551411 Agricultural Work Study
551419 Agricultural Work Study, not for credit
551511 Agricultural Work Experience
551519 Agricultural Work Experience, not for credit

Architecture, Construction, and Science Technology

40100 Architecture and Environmental Design, Other
40200 Architecture, Other
40211 Architecture, Introduction
40212 Architecture, Advanced
40221 Architectural Theory
40300 City, Community, and Regional Planning,
40400 Environmental Design, Other

40600 Landscape Architecture, Other
40700 Urban Design, Other
49900 Architecture and Environmental Design, Other
210113 Electricity 1
210114 Electricity 2
210130 Electricity - Cooperative Education 1
210131 Electricity - Cooperative Education 2
460100 Brickmasonry, Stonemasonry, and Tile
460111 Masonry 1
460112 Masonry 2
460113 Masonry 3
460121 Tile Setting and Plastering
460131 Concrete Technician
460200 Carpentry, Other
460211 Carpentry 1
460212 Carpentry 2
460213 Carpentry 3
460311 Housewiring 1
460312 Housewiring 2
460400 Miscellaneous Construction Trades, Other
460411 Building Construction 1
460412 Building Construction 2
460413 Building Construction 3
460421 Painting and Decorating
460422 Flooring Installation
460431 Building Maintenance
460432 Home Repair/Maintenance
460451 Building Construction - Cooperative Education
460452 Building Construction - Cooperative Education
460500 Plumbing, Pipefitting, and Steamfitting, Other
460511 Plumbing 1
460512 Plumbing 2
469900 Construction Trades, Other
480121 Architectural Drawing 1
480122 Architectural Drawing 2
480123 Architectural Drawing 3
480124 Architectural Drawing 4
558011 General Construction Trades 1
558019 General Construction Trades 1, not for credit
558021 General Construction Trades 2
558029 General Construction Trades 2, not for credit
558031 General Construction Trades 3
558039 General Construction Trades 3, not for credit
558111 Brickmasonry, Stonemasonry, And Tile
558119 Brickmasonry, Stonemasonry, And Tile
558121 Brickmasonry, Stonemasonry, And Tile
558129 Brickmasonry, Stonemasonry, And Tile
558211 Carpentry 1
558219 Carpentry 1, not for credit
558221 Carpentry 2
558229 Carpentry 2, not for credit
558311 Plumbing 1
558319 Plumbing 1, not for credit
558321 Plumbing 2
558329 Plumbing 2, not for credit
558411 Construction Trades Work Study 1
558419 Construction Trades Work Study 1, not for credit
558421 Construction Trades Work Study 2
558429 Construction Trades Work Study 2, not for credit
558511 Construction Trades Work Experience 1
558519 Construction Trades Work Experience 1, not for credit
558521 Construction Trades Work Experience 2
558529 Construction Trades Work Experience 2, not for credit

Business

60100 Business and Management, Other General
60111 Business Introduction
60121 Business Law
60131 Business, Independent Study
60141 Business Education, Cooperative
60151 *
60200 Accounting, Other
60211 Accounting/Business Management Careers -
60300 Banking and Finance, Other
60311 Financial Careers
60321 Real Estate Finance
60331 Consumer Lending
60400 Business Administration and Management,
60411 Business Organization and Management
60421 IB Business Management
60500 Business Economics, Other
60511 Business Economics
60600 Human Resources Development, Other
60700 Institutional Management, Other
60711 Hotel and Motel Management
60800 Insurance and Risk Management, Other
60811 Insurance Careers
60900 International Business Management, Other
61000 Investments and Securities, Other
61011 Investments and Taxation
61100 Labor Industrial Relations, Other
61200 Management Information Systems, Other
61300 Management Science, Other
61400 Marketing Management and Research, Other

61411 Marketing Management and Decision Making
61500 Organizational Behavior, Other
61600 Personnel Management, Other
61800 Small Business Management and Ownership,
61811 Small Business Management
61900 Taxation, Other
62000 Trade and Industrial Supervision and
69900 Business and Management, Other
70100 Accounting, Bookkeeping, and Related
70111 Bookkeeping 1
70112 Bookkeeping 2
70121 Accounting 1
70122 Accounting 2
70131 Advanced Accounting
70141 Bookkeeping and Accounting 1
70142 Bookkeeping and Accounting 2
70151 Recordkeeping 1
70152 Recordkeeping 2
70161 Office Machines
70162 Office Machines, Vocational
70200 Banking and Related Financial Programs,
70201 Banking and Financial Careers
70211 Bank Teller
70231 Bank Proof Operator
70241 Bank Data Entry Occupations
70251 Banking and Financial Careers - Cooperative
70300 Business Data Processing and Related
70311 Computers In Business
70321 Business Data Processing 1
70322 Business Data Processing 2
70331 Business Computer Programming 1
70332 Business Computer Programming 2
70341 Key Punch Operator
70351 Data Entry Operator 1
70352 Data Entry Operator 2
70371 Peripheral Computer Operator
70400 Office Supervision and Management, Other
70500 Personnel and Training Programs, Other
70600 Secretarial and Related Programs, Other
70611 Shorthand 1
70612 Shorthand 2
70621 Transcription
70631 Secretarial Administration 1
70632 Secretarial Administration 2
70641 Word Processing 1
70642 Word Processing 2
70643 Word Processing 3
70651 Reprographics
70661 Legal Office Procedures
70671 Medical Office Procedures
70681 Legal/Medical Office Procedures
70700 Typing, General Office, and Related Programs,
70712 Typewriting 2
70713 Typewriting 3
70731 Office Procedures 1
70732 Office Procedures 2
70733 Simulated Office
70741 Office Education 1, Cooperative
70742 Office Education 2, Cooperative
79900 Business and Office, Other
80300 *
80311 *
80321 Entrepreneurship
80781 Telephone Service Representative
80782 Telephone Directory Assistant
552011 General Office Practice 1
552019 General Office Practice 1, not for credit
552021 General Office Practice 2
552031 General Office Practice 3
552111 Office Machines 1
552121 Office Machines 2
552211 Business Word Study 1
552221 Business Work Study 2
552311 Business Work Experience 1
552321 Business Work Experience 2

Communications and Design

40500 Interior Design, Other
40511 Interior Design
80121 Fashion Design and Illustration
90100 Communications, Other General
90111 Mass Media
90121 Dynamics of Communication
90200 Advertising, Other
90211 Advertising
90300 Communications Research, Other
90441 Yearbook Production 1
90442 Yearbook Production 2
90500 Human Relationships
90600 Radio/Television News Broadcast, Other
90611 Broadcast Journalism
90612 Careers in Radio/Television Broadcasting
90700 Radio/Television, Other General
90711 Broadcasting, Introduction
90721 Television and Taste
90831 Cryptography
99900 Communications, Other
100100 Communication Technologies, Other
100111 World of Communications
100121 Communications Media Production
100131 Photography, Commercial
100132 Photography, Advanced Commercial
100141 Broadcast Management 1
100142 Broadcast Management 2

100143 Broadcasting Practicum
100151 Film Making and Production 1
100152 Film Making and Production 2
100161 Radio Production
100171 Television Production 1
100172 Television Production 2
100173 Television Production 3
100174 Television Production 4
100181 Cable Television
100191 Radio/Television Production 1
100192 Radio/Television Production 2
200511 Housing and Interior Design 1
200512 Housing and Interior Design 2
200513 Interior Design Occupations
200521 Floral Design
200531 Home Decorating
480200 Graphic and Printing Communications, Other
480211 Commercial Art 1
480212 Commercial Art 2
480213 Commercial Art, Cooperative
480214 Commercial Art 3
480221 Graphic Arts 1
480222 Graphic Arts 2
480223 Graphic Arts 3
480224 Graphic Arts 4
480231 Sign Painting 1
480232 Sign Painting 2
480233 Sign Painting 3
480241 Bindery
480251 Electronic Composition
480261 Copy Editing
480271 Desktop Publishing
480281 *
480282 *
480283 *
500400 Design, Other
500411 Graphic Design
500800 Graphic Arts Technology, Other
500811 Computer Graphics Design
557111 Graphic and Printing Communications 1
557119 Graphic and Printing Communications 1, not for credit
557121 Graphic and Printing Communications 2
557129 Graphic and Printing Communications 2, not for credit

Computer and Information Science

110100 Computer and Information Sciences, Other
110121 Computer Appreciation
110122 Computer Mathematics 1
110131 Computer Mathematics 2
110132 Computer Applications
110141 Computer Sciences 3
110142 IB Computer Science
110143 AP Computer Science A
110144 AP Computer Science AB
110145 IB Information Technology in a Global Society
110151 Artificial Intelligence
110152 Multimedia Computer Applications
110161 Desktop Computer Application Suites
110200 Computer Programming, Other
110211 Computer Programming 1
110212 Computer Programming 2
110213 Computer Programming 3
110221 FORTRAN, Introduction
110231 PASCAL, Introduction
110232 Advanced PASCAL
110241 BASIC, Introduction
110242 Advanced BASIC
110251 COBOL, Introduction
110252 Advanced COBOL
110261 LOGO, Introduction
110271 RPG Programming, Introduction
110272 C Programming
110273 C++ Programming
110274 Visual Basic
110300 Data Processing, Other
110311 Data Processing, Introduction
110312 Data Processing, Intermediate
110313 Data Processing, Advanced
110321 Computer Programming - Cooperative
110400 Information Sciences and Systems, Other
110500 Systems Analysis, Other
110600 *
110601 HTML
110602 Java, Java Script
110603 Web Site Design, Development
110604 Network Administration/Management
119900 Computer and Information Sciences, Other
151001 *
470191 Computer Repair and Maintenance

Consumer and Culinary Services

10521 Preveterinary/Animal Care
81111 Tourism Services
81121 Entertainment Park/Tourism - Cooperative
120100 Dry Cleaning and Laundering Services, Other
120111 Dry Cleaning 1
120112 Dry Cleaning 2
120200 Entertainment Services, Other
120300 Funeral Services, Other
120400 Personal Services, Other
120411 Cosmetology

120412 Cosmetology 2
120413 Cosmetology 3
120414 Cosmetology - Cooperative Education 2
120415 Cosmetology - Cooperative Education 2
120421 Barbering 1
120422 Barbering 2
120423 Barbering 3
120431 Personal Services Occupations
129900 Consumer, Personal, and Miscellaneous
190300 S/C Service
200121 Child Development 8
200122 Child Development 1
200123 Child Development 2
200124 Child Development 3
200125 Child Development 4
200126 Current Issues in Child Development
200151 Home Economics Occupations 1, Exploratory
200152 Home Economics Occupations 2, Exploratory
200153 Home Economics Laboratory Assistant
200154 Home Economics Leadership
200161 Family Health 1; Family Nursing
200162 Family Health 2; Family Nursing, Advanced
200188 Nutrition; Fitness Foods
200193 Home Economics - Cooperative Education 1
200194 Home Economics - Cooperative Education 2
200200 Child Care and Guidance Management and
200211 Child Care Services
200221 Child Care Aide
200231 Child Care Management
200241 Foster Care and Family Care
200261 Child Care - Cooperative Education 1
200262 Child Care - Cooperative Education 2
200321 Clothing Maintenance Aide
200361 Wedding and Specialty Consulting
200371 Fashion and Fabric Coordination
200400 Food Production, Management and Services,
200411 Food Service Training
200412 Food Service Training 2
200413 Food Services/Restaurant Management
200421 Food Service Cooperative Training
200431 Baking
200441 Chef
200451 Catering
200471 Food Testing
200481 School Food Service
200500 Home Furnishings and Equipment
200541 Home Furnishings Aide
200571 Home-Service Assisting 1
200572 Home Service Assisting 2
200573 Home Service Asst - Cooperative Education 1
200574 Home Service Asst - Cooperative Education 2
200600 Institutional, Home Management, and
200611 Custodial Services
200621 Executive Housekeeping
200631 Homemaker's Aide
200641 Companion to the Aged
200642 Geriatrics 2
200643 Geriatrics - Cooperative Education 1
200644 Geriatrics - Cooperative Education 2
200651 Consumer Aide
200661 Therapeutic Recreation Aide
200671 Institutional, Home Management Support
209900 Vocational Home Economics, Other
310100 Parks and Recreation, Other General
310111 Recreation Leadership
310200 *
310211 Winter/Ski Resort Operation
310300 Parks and Recreation Management, Other
310400 Water Resources, Other
319900 Parks and Recreation, Other
480411 Meat cutting 1
480412 Meat cutting 2
490131 Air Travel Service Occupations
520106 *
554111 Child Development 1
554119 Child Development 1, not for credit
554121 Child Development 2
554129 Child Development 2, not for credit
554411 Food and Nutrition 2, not for credit
554419 Home Economics Work Study 1, not for credit
554421 Home Economics Work Study 2
554429 Home Economics Work Study 2, not for credit
556111 Home Economics Work Experience 1
556119 Home Economics Work Experience 1, not for credit
556121 Home Economics Work Experience 2
556129 Home Economics Work Experience 2, not for credit
556211 Cosmetology/Barber 1
556219 Cosmetology/Barber 1, not for credit
556221 Cosmetology/Barber 2
556229 Cosmetology/Barber 2, not for credit
556311 Food Services 1
556319 Food Services 1, not for credit
556321 Food Services 2
556329 Food Services 2, not for credit
556411 Custodial And Housekeeping Services 1
556419 Custodial and Housekeeping Services 1, not for credit

556421 Custodial And Housekeeping Services 2
556429 Custodial and Housekeeping Services 2, not for credit
556511 Service Occupations Work Study 1
556519 Service Occupations Work Study 1, not for credit
556521 Service Occupations Work Study 2
556529 Service Occupations Work Study 2, not for credit
556611 Service Occupations Work Experience 1
556619 Service Occupations Work Experience 1, not for credit
556621 Service Occupations Work Experience 2
556629 Service Occupations Work Experience 2, not for credit
557311 Meatcutting 1
557319 Meatcutting 1, not for credit
557321 Meatcutting 2
557329 Meatcutting 2, not for credit

Engineering Technologies

150100 Architectural Technologies, Other
150111 Structural Engineering Technician
150200 Civil Technologies, Other
150211 Surveying
150221 Civil Engineering Technician
150300 Electrical and Electronic Technologies, Other
150311 Audio Electronics
150321 Electrical Technology
150331 Electronic Technology 1
150332 Electronic Technology 2
150333 Electronics Fabrication
150341 Electrical/Electronics Engineering Technician
150400 Electromechanical Instrumentation and
150411 Electromechanical Technology 1
150412 Electromechanical Technology 2
150421 Instrumentation Technology
150431 Computer-Assisted Design/Drafting (CAD)
150500 Environmental Control Technologies, Other
150511 Environmental Control Technologies
150600 Industrial Production Technologies, Other
150601 Industrial Research and Development
150611 Industrial Production Technology 1
150612 Industrial Production Technology 2
150621 Chemical Manufacturing Technology
150631 Optics Technology
150700 Quality Control and Safety Technologies,
150711 Quality Control Technology
150800 Mechanical and Related Technologies, Other
150811 Automotive Design and Technology
150821 Mechanical Engineering Technology
150900 Mining and Petroleum Technologies, Other
150911 Mining Technology
150921 Petroleum Technology
159900 Engineering and Engineering-Related
410100 Biological Technologies, Other
410200 Nuclear Technologies, Other
410300 Physical Science Technologies, Other
419900 Sci & Tech
480100 Drafting, Other
480111 Mechanical Drawing 1
480112 Mechanical Drawing 2
480113 Mechanical Drawing 3
480114 Mechanical Drawing 4
480131 Engineering Drawing 1
480132 Engineering Drawing 2
480141 Blueprint Reading
480151 Drafting 1, Cooperative
480152 Drafting 2, Cooperative

Health Sciences

170100 Dental Services, Other
170111 Dental Assistant 1
170112 Dental Assistant 2
170121 Dental Assistant, Cooperative
170131 Dental Technology 1
170132 Dental Technology 2
170200 Diagnostic and Treatment Services, Other
170211 First Aid
170221 EKG Technician
170300 Medical Laboratory Technologies, Other
170311 Laboratory Program 1
170312 Laboratory Program 2
170321 Chemical Technology 1
170322 Chemical Technology 2
170400 Mental Health/Human Services, Other
170411 Home Health Aide
170421 Community Health
170431 Mental Health Worker
170500 Miscellaneous Allied Health Services, Other
170511 Health Occupations 1
170521 Health Occupations 2
170522 Central Service Technician
170531 Medical Terminology
170541 Medical Records Secretary
170551 Medical Assisting
170561 *
170571 Veterinary Science
170581 Chemistry for Health Science

170591 Health Occupations, Independent Study
170592 Health Occupations - Cooperative Education 1
170593 Health Occupations - Cooperative Education 2
170600 Nursing-Related Services, Other
170611 Student Assessment of Child Health
170621 Nursing, Practical
170631 Nurse's Aide and Orderly
170641 Nurse's Aide, Cooperative
170700 Ophthalmic Services, Other
170711 Optical Services Assistant
170800 Rehabilitation Services, Other
179900 Allied Health, Other
180100 Audiology and Speech Pathology, Other
180200 Basic Clinical Health Sciences, Other
180300 Chiropractic, Other
180400 Dentistry, Other
180500 Emergency/Disaster Science, Other
180600 Epidemiology, Other
180700 Health Sciences Administration, Other
180800 Hematology, Other
180900 Medical Laboratory, Other
181000 Medicine, Other
181100 Nursing, Other
181200 Optometry, Other
181300 Osteopathic Medicine, Other
181400 Pharmacy, Other
181411 Pharmacy Technician
181500 Podiatry, Other
181600 Population and Family Planning, Other
181700 Pre-Dentistry, Other
181800 Pre-Medicine, Other
181801 Medical Ethics
181900 Pre-Pharmacy, Other
182000 Pre-Veterinary, Other
182200 Public Health Laboratory Science, Other
182300 Toxicology (Clinical), Other
182400 Veterinary Medicine, Other
189900 Health Sciences, Other
200461 Dietetic Aide
310121 Advanced Rescue Technology
553011 General Health Occupations 1
553019 General Health Occupations 1, not for credit
553021 General Health Occupations 2
553029 General Health Occupations 2, not for credit
553031 General Health Occupations 3
553039 General Health Occupations 3, not for credit
553111 Health Occupations Work Study 1
553119 Health Occupations Work Study 1, not for credit
553121 Health Occupations Work Study 2
553129 Health Occupations Work Study 2, not for credit
553211 Health Occupations Work Experience 1
553219 Health Occupations Work Experience 1, not for credit
553221 Health Occupations Work Experience 2
553229 Health Occupations Work Experience 2, not for credit

Manufacturing, Repair, and Transportation

80761 Warehousing Industrial and Wholesale
120511 General Services Occupations 1
120512 General Services Occupations 2
120513 General Services Occupations 3
120514 General Services Occupations 4
120521 Building and Grounds Maintenance
120522 Building and Grounds Maintenance
120523 Building and Grounds Maintenance
120531 Industrial Maintenance/Mechanics 1
120532 Industrial Maintenance/Mechanics 2
200300 Clothing, Apparel, and Textiles Management,
200311 Clothing Occupations 1
200312 Clothing Occupations 2
200313 Clothing Occupations 3
200314 Clothing Occupations - Cooperative Education
200315 Clothing Occupations - Cooperative Education
200331 Commercial Garment and Apparel
200341 Custom Apparel Construction
200351 Custom Tailoring and Alteration
200381 Textiles Testing
200391 Clothing Production Management
200551 Custom Drapery and Window Treatment
200561 Custom Slipcovering and Upholstering
210115 Electronics 1
210116 Electronics 2
210117 Electronics 3
210118 Electronics 4
210119 Electricity/Electronics
210120 Electricity and Electronics, Advanced
210121 Machine Shop 1
210122 Machine Shop 2
210123 Machine Shop 3
210124 Machine Shop 4
210140 Electronics - Cooperative Education 1
210141 Electronics - Cooperative Education 2
210150 Electricity/Electronics - Cooperative Education
210151 Electricity/Electronics - Cooperative Education

460300 Electrical and Power Transmission Installation,
460321 Electric Power and Communications
470100 Electrical and Electronics Equipment Repair,
470111 Small Appliance Repair
470121 Radio and TV Repair 1
470122 Radio and TV Repair 2
470123 Radio and TV Repair 3
470124 Telecommunications Technician
470131 Appliance Repair 1
470132 Appliance Repair 2
470141 Vending Machine Repair
470151 Business Machine Repair
470161 Industrial Electricity
470171 Industrial Electronics
470181 Food Processing Machine Maintenance
470200 Heating, Air Conditioning, and Refrigeration
470211 Air Conditioning, Refrigeration, and Heating
470212 Air Conditioning, Refrigeration, and Heating,
470213 Air Conditioning, Refrigeration and Heating 3
470300 Industrial Equipment Maintenance and Repair,
470311 Industrial Mechanics 1
470312 Industrial Mechanics 2
470321 Diesel Mechanics
470331 Industrial Maintenance Mechanics 1
470332 Industrial Maintenance Mechanics 2
470341 Petroleum Drilling Equipment Operation and
470342 Petroleum Drilling Equipment Operation and
470343 Petroleum Drilling Equipment Operation and
470400 Miscellaneous Mechanics and Repairers, Other
470411 Musical Instrument Repair
470421 Instrument Maintenance and Repair
470431 Shoe Repair and Orthopedics 1
470432 Shoe Repair and Orthopedics 2
470433 Watch and Clock Repair
470434 Bicycle Repair
470500 Stationary Energy Sources, Other
470511 Power Mechanics 1
470512 Power Mechanics 2
470513 Power Mechanics 3
470514 Power Mechanics 4
470515 Technical Systems
470521 *
470600 Vehicle and Mobile Equipment Mechanics and
470611 Small Engine Repair 1
470612 Small Engine Repair 2
470621 Auto Mechanics 1
470622 Auto Mechanics 2
470623 Auto Mechanics 3
470624 Auto Mechanics - Cooperative Education 1
470625 Auto Mechanics - Cooperative Education 2
470631 Auto Body 1
470632 Auto Body 2
470633 Auto Body 3
470641 Auto Service 1
470642 Auto Service 2
470661 Airframes 1
470662 Airframes 2
470671 Aviation Powerplant 1
470672 Aviation Powerplant 2
470673 Aviation Powerplant 3
470674 Aviation Powerplant 4
470681 Aviation Quality Control 1
470682 Aviation Quality Control 2
470691 Aircraft Sheetmetal 1
470692 Aircraft Sheetmetal 2
479900 Mechanics and Repairers, Other
480300 Leatherworking and Upholstering, Other
480311 Leatherwork 1
480312 Leatherwork 2
480321 Upholstery
480322 Upholstery, Advanced
480331 Auto Upholstery
480500 Precision Metal Work, Other
480511 Metal 1
480512 Metal 2
480513 Metal 3
480514 Metal 4
480521 Welding 1
480522 Welding 2
480523 Welding 3
480524 Welding - Cooperative Education
480531 Sheet Metal 1
480532 Sheet Metal 2
480541 Metal Restoration
480551 Foundry 1
480552 Foundry 2
480600 Precision Work, Assorted Materials, Other
480611 Plastics 1
480612 Plastics 2
480621 Space Age Plastics
480700 Woodworking, Other
480711 Woodworking 1
480712 Woodworking 2
480713 Woodworking 3
480714 Woodworking 4
480721 Furniture Refinishing

480731 Cabinetmaking 1
480732 Cabinetmaking 2
489900 Precision Production, Other
490100 Air Transportation, Other
490111 Aeronautics 1
490112 Aeronautics 2
490121 Aviation Technology 1
490122 Aviation Technology 2
490123 Aviation Technology 3
490124 Aviation Technology 4
490141 Aircraft Parts Management 1
490142 Aircraft Parts Management 2
490200 Vehicle and Equipment Operation, Other
490211 Forklift Operator
490212 Tractor-Trailer Truck Driving
490213 Heavy Vehicle Operation/Earth Moving
490214 Bus Driver/Chauffeur
490300 Water Transportation, Other
490311 Marine Mechanics, Basic
490312 Marine Mechanics, Advanced
490321 Boat Building
490331 Navigation
490341 Aquatic Occupations
490411 Introduction to Transportation Industry
490412 Transportation Technology 2
490421 Transportation/Traffic Technician
499900 Transportation and Material Moving, Other
520107 *
557211 Leatherwork and Upholstery 1
557219 Leatherwork and Upholstery 1, not for credit
557221 Leatherwork and Upholstery 2
557229 Leatherwork and Upholstery 2, not for credit
557411 Precision Production Work Study 1
557419 Precision Production Work Study 1, not for credit
557421 Precision Production Work Study 2
557429 Precision Production Work Study 2, not for credit
557511 Precision Production Work Experience 1
557519 Precision Production Work Experience 1, not for credit
557521 Precision Production Work Experience 2
557529 Precision Production Work Experience 2, not for credit
559011 Auto Service 1
559019 Auto Service 1, not for credit
559021 Auto Service 2
559029 Auto Service 2, not for credit
559111 Auto Service, Work Experience 1
559119 Auto Service, Work Experience 1, not for credit
559121 Auto Service, Work Experience 2
559129 Auto Service, Work Experience 2, not for credit

Marketing

60712 Hotel and Motel Training
61700 Real Estate, Other
61711 Real Estate Marketing
80100 Apparel and Accessories Marketing, Other
80111 Fashion Merchandising
80131 Fashion Merchandising - Cooperative
80132 Fashion Merchandising - Cooperative
80200 Business and Personal Services Marketing,
80331 Starting Your Own Business*
80400 Financial Services Marketing, Other
80500 Floristry, Farm and Garden Supplies
80511 Floral Sales
80600 Food Marketing, Other
80611 Food Marketing/Distribution - Overview
80612 Grocery Management
80621 Food Marketing - Cooperative Education 1
80622 Food Marketing - Cooperative Education 2
80700 General Marketing, Other
80711 Distributive Education 1
80712 Distributive Education 2
80713 Distributive Education 3
80721 Distributive Education 1, Cooperative
80722 Distributive Education 2, Cooperative
80731 Salesmanship
80741 Retail Learning Laboratory
80751 Cashier Checker Training
80771 Distributive Education, Independent Study
80800 Home and Office Products Marketing, Other
80811 Computer Sales Representative
80900 Hospitality and Recreation Marketing, Other
80911 Orientation to Hospitality Careers
80921 Hospitality Sales 1
80922 Hospitality Sales 2
81000 Insurance Marketing, Other
81100 Transportation and Travel Marketing, Other
81200 Vehicles and Petroleum Marketing, Other
81211 Auto Parts Merchandising
81221 Automotive Professional Training
89900 Marketing and Distribution, Other

Public Services

70662 Court Reporter
130100 Education, Other General
130200 Bilingual/Bicultural Education, Other
130300 Curriculum and Instruction, Other
130400 Education Administration, Other
130500 Educational Media, Other
130600 Evaluation and Research, Other
130700 International and Comparative Education,
130800 School Psychology, Other
130900 Social Foundations, Other
131000 Special Education, Other
131100 Student Counseling and Personnel Services,
131200 Teacher Education, General Programs, Other
131201 *
131202 *
131300 Teacher Education, Specific Subject Areas,
131400 Teaching English as a Second
139900 Education, Other
182100 Prosectorial Science, Other
200251 Teacher Aide/Elementary
200252 Teacher Aide/Secondary
250100 Library and Archival Sciences, Other General
250111 Library Science
250200 Archival Science, Other
250300 Library Assisting, Other
250311 Library Assistant
250400 Library Science, Other
250500 Museology, Other
259900 Library and Archival Sciences, Other
430100 Criminal Justice, Other
430111 Law Enforcement
430121 Law Science
430200 Fire Protection, Other
430211 Fire Fighting Practices
430221 Fire Safety
430300 *
430311 Security Guard
439900 Protective Services, Other
440100 Public Affairs, Other General
440200 Community Services, Other
440300 *
440400 Public Administration, Other
440500 Public Policy Studies, Other
440600 Public Works, Other
440700 Social Work, Other
440711 Human Services
449900 Public Affairs, Other
450400 Criminology, Other

Enrichment and Other Non-Academic and Non-CTE Courses

070153 Personal Recordkeeping
070613 Speed Writing
120211 Sports Officiating
170561 Sports Medicine
230413 Handwriting
230414 Interpersonal Communication
231215 Speed Reading
240121 Summer Abroad
240131 Independent Study
240141 Gifted and Talented Program
240152 Academic Competition
240161 Senior Project
240162 Orientation
280100 Aerospace Science (Air Force), Other
280111 Aerospace Education
280112 Aerospace Education 2
280113 Aerospace Education 3
280114 Aerospace Education 4
280121 Civil Air Patrol
280200 Coast Guard Science, Other
280300 Military Science (Army), Other
280311 Army Leadership Development, Introduction
280312 Army Intermediate Leadership Development
280313 Army Applied Leadership Development
280314 Army Advanced Leadership Development
280400 Naval Science (Navy, Marines), Other
280411 Naval Science 1
280412 Naval Science 2
280413 Naval Science 3
280414 Naval Science 4
280421 Marine Corps Leadership Education 1
280422 Marine Corps Leadership Education 2
280423 Marine Corps Leadership Education 3
280424 Marine Corps Leadership Education 4
289900 Military Sciences, Other
300131 Outdoor Education
300200 Clinical Pastoral Care, Other
310111 Recreation Aide
310121 Search and Rescue
310200 Outdoor Recreation, Other
320100 Basic Skills, Career and Employment, Other
320200 Basic Skills, General, Other
320201 Resource Room (NON Special Ed)
320211 Study Dynamics
320221 Test Taking
320231 Individualized Academic Program
330100 Citizenship/Civic Activities, Other

330111 Student Assistant
330121 Pep Squad
330131 Student Government
330141 Tutoring
330151 Community Service
340100 Health-Related Activities, Other
340111 Physical and Health Education 7
340112 Physical and Health Education 8
340113 Physical and Health Education 9
340114 Physical Education 10
340115 Physical Education 11
340116 Physical Education 12
340121 Adaptive Physical Education (Multihandicapped)
340122 Physical Education - Medically Excused
340129 Adaptive Physical Education (Multihandicapped), not for credit
340131 Health 7
340132 Health 8
340133 Health 9
340134 Health 10
340135 Health 11
340136 Health 12
340137 State Requirements
340138 Modern Medical Issues
340141 Drugs Alcohol and Tobacco
340151 Driver Education, Classroom
340152 Driver Education, Practice
340161 Physical Education Leadership Training
340171 Life Saving
340181 Safety
340191 Sex Education
350100 Interpersonal Skills, Other
350131 Peer Counseling
350141 Dropout Prevention
350151 Leadership
360100 Leisure and Recreational Activities, Other
360111 Sports, Individual
360121 Sports, Team
360131 Gymnastics
360141 Drill Team; Band Physical Education; Color Guard
360151 Track and Field
360161 Aquatics
360171 Conditioning and Athletics
360181 Motorcycle Operation
360191 Recreational Activities
360192 Experiential Outdoor Education
370100 Personal Awareness, Other
370111 Personal Development Techniques
370121 Coping with Personal Problems
370131 Self Perception
380200 Religion, Other
380201 Catholicism, Foundations
380202 Who Is Jesus
380203 Scripture
380204 Moral Issues, Social and Individual
380205 Marriage, Life Choices in Christian Living
380206 Comparative Religion
380207 Sacraments
380208 Eastern Religious Thought
380209 Religion and Psychology
380210 Western Religions
380211 Religion and Literature
380212 Religion, Introduction
380213 Prayer and Liturgy
380214 Judaism, Foundations
380215 Protestantism, Foundations
380216 Religious Movements in America
380217 Islam and the Koran
389900 Philosophy and Religion, Other
390100 Biblical Languages, Other
390200 Bible Studies, Other
390300 Missionary Studies, Other
390400 Religious Education, Other
390500 Religious Music, Other
390600 Theological Studies, Other
390611 Theological Studies
399900 Theology, Other
430221 Fire Safety Education
450604 Filing Your Income Taxes
542401 Functional Academics
542409 Functional Academics, not for credit
543001 Activities of Daily And Family Living
543009 Activities of Daily and Family Living, not for credit
543101 Social/Behavioral Skills
543109 Social/Behavioral Skills, not for credit
543201 Functional Leisure And Recreational Skills
543209 Functional Leisure and Recreational Skills, not for credit
543301 Functional Health
543309 Functional Health, not for credit
543401 Functional Transition Skills
543409 Functional Transition Skills, not for credit
544501 Functional Social Skills
544509 Functional Social Studies, not for credit
549401 Handicapped Developmental Support Services
549409 Handicapped Developmental Support Services, not for credit
563211 Resource Transition Skills
563219 Resource Transition Skills, not for credit
569009 General Tutorial Services, not for credit
569101 Resource Study Skills
569109 Resource Study Skills, not for credit
569201 School and Social Survival Skills

569209 School and Social Survival Skills, not for credit
569301 Resource Survival Skills
569309 Resource Survival Skills, not for credit
569401 Handicap Specific Support Services
569409 Handicap Specific Support Services, not for credit