DOCUMENT RESUME

ED 392 973 CE 071 146

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TITLE Trends in Participation in Secondary Vocational Education: 1982-1992. Statistical Analysis Report.
INSTITUTION MPR Associates, Berkeley, CA.
SPONS AGENCY National Center for Education Statistics (ED), Washington, DC.
REPORT NO NCES-96-004
PUB DATE Apr 96
NOTE 75p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Academic Education; Access to Education; Disabilities; *Enrollment; *Enrollment Trends; High School Graduates; Longitudinal Studies; Nontraditional Education; Secondary Education; *Student Participation; Tables (Data); Trend Analysis; *Vocational Education
IDENTIFIERS High School and Beyond (NCES); High School Transcript Study 1987; High School Transcript Study 1990; National Education Longitudinal Study 1988

ABSTRACT

Trends in participation in secondary vocational education from 1982 through 1992 were identified by analyzing the following four transcript data sets: High School and Beyond (1982 graduates); National Assessment of Educational Progress 1987 High School Transcript Study; National Assessment of Educational Progress 1990 High School Transcript Study; and National Educational Longitudinal Study of 1988. Special attention was paid to general course-taking patterns among public high school graduates, detailed trends in vocational course taking, and relationships between vocational and academic course taking. Among the study's main conclusions were the following: (1) vocational students completed more academic coursework and more advanced academic coursework in 1992 than in 1982; (2) participation in high-technology programs did not increase significantly between 1982 and 1992; (3) students' participation in vocational programs that are nontraditional for their gender did not increase significantly during the period studied, although gender disparities did decrease somewhat because of declines in rate of program participation by the predominant gender group in certain fields; (4) vocational education programs appear to be accessible to students with disabilities; and (5) participation in secondary-level vocational education is becoming increasingly diffuse. (Contains 18 tables/figures. Appended are 17 standard error tables, a glossary, and technical notes.) (MN)

# Trends in Participation in Secondary Vocational Education: 1982–1992

NATIONAL CENTER FOR EDUCATION STATISTICS

Statistical Analysis Report April 1996

# Trends in Participation in Secondary Vocational Education: 1982–1992

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# Highlights

*General Course-Taking Patterns Among Public High School Graduates*

- Public high school graduates in the class of 1992 earned on average more total credits, more academic credits, and fewer vocational credits than did graduates in the class of 1982. The number of credits completed in the personal use curriculum was unchanged over time.

- Trends in academic and personal use course taking were much the same for all student subgroups. Among subgroups defined by gender, race-ethnicity, parents' educational attainment, and disability status, there were increases in academic course taking, stable levels of personal use course taking, and increases in the total number of credits earned.

- Trends in vocational course taking varied among the different student subgroups. While vocational course taking declined among groups defined by gender and parents' educational attainment, as well as among whites, blacks, Hispanics, and students with no disabilities, course taking in the vocational curriculum was unchanged between 1982 and 1992 among Asians, American Indians, and students with disabilities.

- Despite the similar trends in course taking, differences in patterns of participation persisted between groups. For example, females consistently earned more academic credits than did males, and graduates with disabilities consistently earned more credits in the vocational curriculum than graduates with no disabilities.

*Detailed Trends in Vocational Course Taking*

- Declines in vocational course taking were evident throughout the vocational curriculum. Credits earned in the general labor market preparation, consumer and homemaking education, and occupationally specific education curricula all declined between 1982 and 1992.

- The composition of course taking within the occupationally specific vocational curriculum shifted away from courses that were part of an organized sequence and toward specialty courses within the various vocational fields.

- The downward trend in occupationally specific vocational course taking was shared by most student groups, but in contrast to the general pattern, Asians, American Indians, and students with disabilities completed about the same number of courses in the occupationally specific vocational curriculum in 1992 as they had in earlier years.

- The rate of vocational concentration (defined as completing three or more credits in a single occupational field) also declined between 1992 than in 1982. However, declining rates of vocational concentration were confined to the business and the trade

and industry fields; rates of concentration in the other vocational fields were unchanged over time.

- Patterns of concentration and trends over time varied by gender. In both 1982 and 1992, males were more likely to concentrate in trade and industry and in agriculture than were females, while females were more likely to concentrate in business than were males. However, the disparities between males and females in rates of concentration in these subject areas declined between 1982 and 1992, primarily because of large declines in the rate of concentration by the predominant group.

*Relationship Between Vocational and Academic Course Taking*

- The number of academic credits completed by graduates was inversely related to the number of vocational credits they completed: as the number of vocational credits completed increased, the number of academic credits completed declined.

- Regardless of the number of vocational credits completed, academic course taking increased between 1982 and 1992, including large increases in math and science.

- Differences in number of credits earned in math and science between those graduates who completed fewer than 2.0 vocational credits and those who completed more than 8.0 vocational credits declined between 1982 and 1992. However, differences between these groups remained large in advanced math and advanced science.

*Conclusions*

- The trends in course taking between 1982 and 1992 were consistent with the goals of education reform outlined in *A Nation at Risk*. Students completed more academic coursework, and more advanced academic coursework in 1992 than in 1982.

- Participation in high-technology programs did not significantly increase between 1982 and 1992. Likewise, participation by students in vocational programs that are nontraditional for their gender did not increase, although gender disparities fell somewhat due to large declines in the rates of program participation by the predominant gender group in certain fields.

- To the extent that one can measure access to vocational programs with course-taking data, Congress' goal of ensuring that vocational education programs are accessible to students with disabilities appears to have been met.

- Downward trends in patterns of vocational concentration, coupled with shifts in occupationally specific course taking away from sequential courses and towards specialty courses not clearly linked to a sequential program, suggest that participation in vocational education at the secondary level may be increasingly diffuse.

# Acknowledgments

The author would like to thank all those who contributed to the production of this report. At MPR Associates, Andrea Livingston and Karen Singson edited the various drafts of the report, and Martha Alt provided assistance in preparing the final report. Lynn Sally and Leslie Retallick prepared the tables and graphics and provided essential production assistance, and Ellen Liebman prepared the transcript analysis files and did the programming for the tables.

At the National Center for Education Statistics (NCES), Mary Frase and James Houser in the Data Development Division offered guidance in specifying the scope of work, and they also helped in editing the report. The author would especially like to thank the members of the adjudication panel for their careful review and thoughtful comments on the final draft. Panel members from NCES were Mike Cohen from the Statistical Standards and Methodology Division, Andrew Kolstad from the Education Assessment Division, and Jeff Owings from the Education Surveys Division. Other panel members were Rick Apling from the Congressional Research Service, Augusta Souza Kappner from the Office of Vocational and Adult Education, and Lisa Hudson in the Office of Educational Research and Improvement.

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# Chapter 1

# Introduction

Educational researchers and policymakers have become increasingly interested in trends in vocational course taking in light of the education reforms that were implemented in response to *A Nation at Risk*.[1] In particular, they have become concerned about how vocational course-taking patterns have changed during a period in which education policy has primarily emphasized academic education. The report *Participation in Secondary Vocational Education: 1982-87* described patterns of participation in secondary vocational education by public high school graduates between 1982 and 1987.[2] Since the publication of that report in January 1992, two additional transcript data sets have become available: the 1990 National Assessment of Educational Progress High School Transcript Study (NAEP:90), and the transcript component of the National Education Longitudinal Study of 1988 (NELS:88), which contain complete transcripts for a sample of students who completed high school in 1990 and 1992, respectively.[3] With these additional data points, the analysis of vocational course taking among public high school graduates that was presented in *Participation in Secondary Vocational Education* can be updated to encompass trends through 1992, and it can also be expanded to include additional demographic characteristics that were previously unavailable.

Many of the questions that were raised in the earlier study are just as timely now, including the following:

- What percentage of public high school graduates participated in vocational education in 1990 and 1992?
- How much vocational education did secondary students take in 1990 and 1992? Did this amount represent a change from levels of participation in 1982 and 1987?
- In what types of vocational programs did high school graduates enroll? Were the patterns of enrollment in 1990 and 1992 different from those in the two earlier years?
- Although levels of participation in vocational education remained relatively steady between 1982 and 1987, levels of participation in academic education increased. Did these trends in academic and vocational course taking persist between 1987 and 1992?

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[1]The National Commission on Excellence in Education, *A Nation at Risk: The Imperative for Educational Reform* (Washington, D.C.: U.S. Department of Education, April 1983).

[2]E. Gareth Hoachlander, *Participation in Secondary Vocational Education, 1982-87* (Washington, D.C.: U.S. Department of Education, Office of Educational Research and Improvement, January 1992).

[3]See appendix C for a more detailed definition of students who were included in this report.

Furthermore, the new transcript data sets offer an opportunity to examine whether changes in vocational course taking between 1982 and 1992 were consistent with the goals of federal vocational education laws, embodied in the Perkins Act and other legislation. More specifically:

- Congress has promoted increased participation by students in vocational programs that are "nontraditional" for their gender. Have nontraditional enrollments been increasing?
- Congress has also sought to ensure that vocational education programs are accessible to students with disabilities. To what extent is this student population participating in vocational education?

- When the Carl D. Perkins Vocational Education Act was reauthorized in 1990 (and renamed the Carl D. Perkins Vocational Education and Applied Technology Act), Congress focused new attention on high-technology programs. Have enrollments in these programs (e.g., technical, communications, and to a lesser extent precision production) increased, and if so, who is participating in them?

Finally, the new transcript data sets permit inquiries that were precluded by the limited availability of student demographic data in the 1987 NAEP transcript study. The previous trend study examined course taking in relation to two demographic variables—gender and race-ethnicity; this study expands the list of demographic characteristics to include disability status (1987 and 1992), parents' education (1982 and 1992), and limited-English-proficiency (LEP) status (1992 only).

*Measures of Course Taking and the Organization of Coursework*

Course taking is measured in this report using "Carnegie units." One Carnegie unit represents the time equivalent to a one-period course that meets daily for an entire academic year. Hence, a course that met daily for one period over a semester was counted as one-half of a Carnegie unit, while a course that met daily for two periods over an entire academic year was counted as two Carnegie units. In instances where course credits were not awarded on a year or semester basis, credits were standardized as fractions or multiples of Carnegie units (as appropriate) to facilitate comparisons within and across samples. Throughout the rest of this report the term "credits" will be used in place of "Carnegie units" to simplify the presentation.

Courses were organized within the framework of the Secondary School Taxonomy (SST) to ensure the consistent placement of courses from the secondary curriculum.[4] This taxonomy contains three major curriculum categories: academic, vocational, and personal use. The academic curriculum comprises the subject areas of mathematics, science, English, social studies, foreign languages, and fine arts. Each of these subject areas was then categorized into subfields, such as composition and writing in English, and applied math or

[4]Antoinette Gifford, John Tuma, and E. Gareth Hoachlander, *The Secondary School Taxonomy Report* (Washington, D.C.: U.S. Department of Education, National Assessment of Vocational Education, 1989).

geometry in mathematics, as well as by level (remedial, regular, honors, or advanced placement) wherever possible. Three advanced academic course-taking categories are presented in tables in chapter 3 of this report: advanced English, which includes honors and advanced placement courses; advanced mathematics, which includes algebra 2, trigonometry, analytic geometry, precalculus, probability and statistics, and calculus; and advanced science, which includes chemistry, physics, and advanced biology (including advanced placement biology).

The vocational curriculum contains three major subdivisions: consumer and homemaking education, general labor market preparation, and occupationally specific education. Consumer and homemaking education courses provide training and teach skills in home economics, child development, parent education, and other activities that lie primarily outside of the paid labor force. Courses that are designed to impart widely applicable vocational skills, such as typing, business math, or business English, or that provide a broad overview of vocational alternatives, such as introduction to industrial arts or career exploration, are included in the general labor market preparation curriculum. Courses that teach material relevant to particular jobs or industries are included in the occupationally specific vocational education curriculum, which are in turn organized by vocational field: agriculture, business, marketing, health, occupational home economics, trade and industry, and technical and communications. Course taking in the occupationally specific fields is then further divided by course level: first course in a sequence, second or higher course in a sequence, and specialty courses not clearly linked to a sequence of courses.

The personal use curriculum is a residual category that includes courses that could not be fit into the academic or vocational curricula, or that were offered in relatively few schools. These courses include general skills, health and physical education, religion and theology, driver training, and military science.

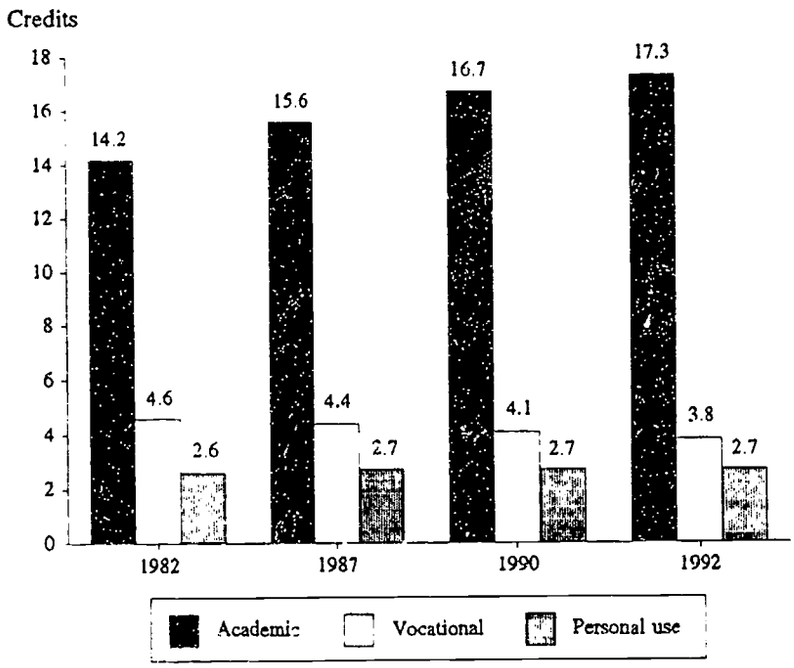
# Chapter 2

# General Trends in Participation in the Secondary Curriculum

## General Trends in Course Taking

Between 1982 and 1992, the average number of credits earned by public high school graduates increased from 21.4 to 23.8.[5] This rise in total credits was accounted for almost entirely by increases in academic courses, which increased from an average of 14.2 to an average of 17.3 credits (figure 2.1). Vocational credits completed by high school graduates declined from 4.6 to 3.8, and credits completed in the personal use curriculum remained essentially unchanged, averaging 2.6 in 1982 and 2.7 in 1992.

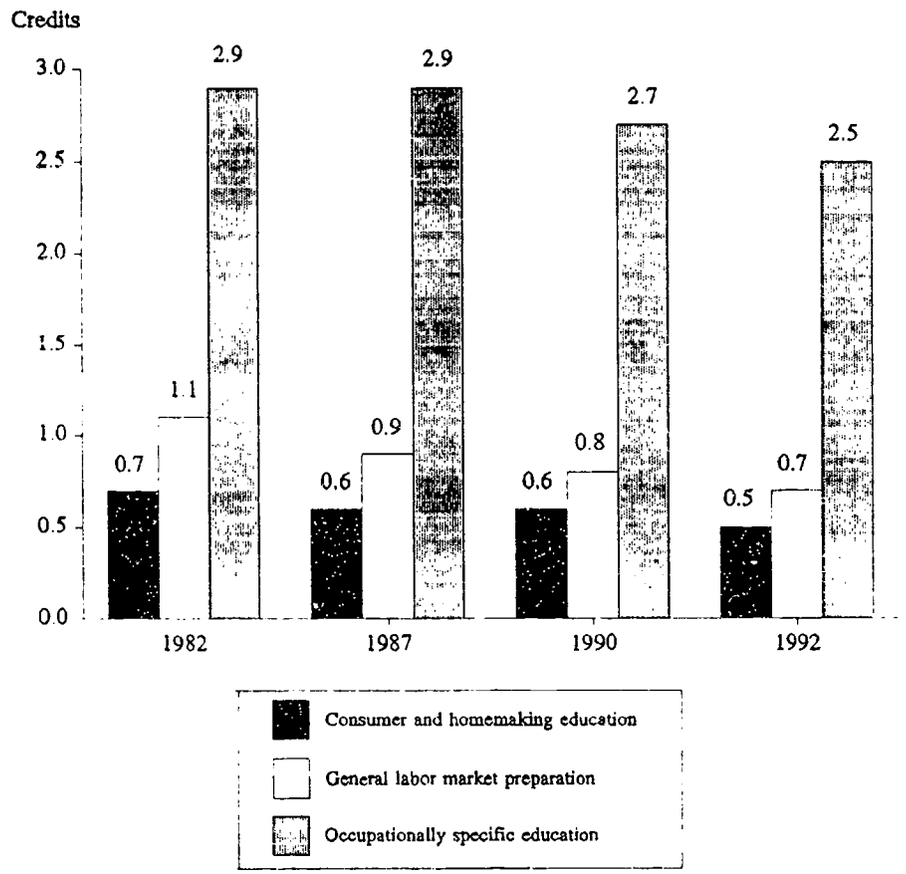
**Figure 2.1—Average number of credits completed by public high school graduates, by curriculum area: 1982–1992**




SOURCE: National Center for Education Statistics, High School and Beyond, 1987 High School Transcript Study, 1990 High School Transcript Study, and National Education Longitudinal Study of 1988.

[5]The number of credits required for hign school graduation vary from state to state, but these data show that on average, high school graduates earned more credits than the average state required. According to data collected by the Education Commission of the States, the median number of credits required for graduation by states was 20 in 1992. However, these data ranged from no state mandated credit requirements to 24 credits. Cited in the *Digest of Education Statistics: 1993* (Washington, D.C.: National Center for Education Statistics), table 153.

Figure 2.2—Average number of credits completed by public high school graduates in vocational curriculum areas: 1982–1992




SOURCE: National Center for Education Statistics, High School and Beyond, 1987 High School Transcript Study, 1990 High School Transcript Study, and National Education Longitudinal Study of 1988.

The decline in vocational course taking was evident throughout the vocational curriculum (figure 2.2). However, it is the declining level of participation in the occupationally specific curriculum, from 2.9 to 2.5 credits between 1982 and 1992, that is likely to have the greatest impact on students' labor market prospects after high school. In an exhaustive literature review on the topic, the National Assessment of Vocational Education concluded that "the research consistently finds that wage and employment outcomes are superior for those whose field of study and occupation match . . . , [and that] . . . vocational education students who complete at least two credits in [an occupationally specific field] and find jobs related to their training have higher earnings and less unemployment over time than those with a more general background. In addition, individuals with higher concentrations of coursework are more likely to find a training-related job."[6]

[6]U.S. Department of Education, Office of Educational Research and Improvement, *National Assessment of Vocational Education Final Report to Congress* (Washington, D.C.: U.S. Government Printing Office, July 1994), v. II, 140.

Trends in course taking within the occupationally specific curriculum were also a matter of concern for the National Assessment of Vocational Education. Between 1982 and 1992, credits completed in the occupationally specific curriculum declined in advanced vocational courses and increased in specialty topics (those not clearly linked to a coherent program of coursework) (table 2.1). For example, 1982 high school graduates completed an average of 1.8 credits in the first course of a sequence within the occupationally specific curriculum (compared with 1.5 credits for 1992 graduates ), 0.9 credits in the second or higher course in a sequence (compared with 0.7 credits), and 0.2 credits in specialty courses (compared with 0.4 credits).

**Table 2.1—Average number of credits earned by public high school graduates in the occupationally specific vocational education curriculum, by course level: 1982–1992**

| Year of graduation | First course | Second course or higher | Specialty |
|---|---|---|---|
| 1982 | 1 8 | 0.9 | 0.2 |
| 1987 | 1.8 | 0.9 | 0.2 |
| 1990 | 1.7 | 0.7 | 0.3 |
| 1992 | 1.5 | 0.7 | 0.4 |

SOURCE. National Center for Education Statistics, High School and Beyond, 1987 High School Transcript Study, 1990 High School Transcript Study, and National Education Longitudinal Study of 1988.

Table 2.2 shows the percentage of graduates who completed at least one course in each curriculum. All graduates participated in the academic curriculum because each transcript had to show a positive number of English credits to be included in the sample. Although participation in the vocational curriculum was not a sample selection criterion, participation in this curriculum was almost universal. The rate of participation did decline between 1982 and 1992, from 97.8 percent to 96.5 percent of all graduates, but the decline was small.

Table 2.2—Percentage of public high school graduates with credits in the academic, vocational, and personal use curricula and in the vocational subcurricula: 1982–1992

| Year of graduation | Percentage of graduates with credits in | | | Percentage of graduates with vocational credits in | | |
|---|---|---|---|---|---|---|
| | Academic | Vocational | Personal use | General labor market preparation | Consumer and homemaking education | Occupationally specific education |
| 1982 | 100.0 | 97.8 | 98.5 | 78.6 | 49.9 | 86.7 |
| 1987 | 100.0 | 97.8 | 98.5 | 78.5 | 47.1 | 88.5 |
| 1990 | 100.0 | 97.4 | 99.5 | 71.6 | 48.1 | 86.8 |
| 1992 | 100.0 | 96.5 | 99.4 | 62.4 | 45.4 | 87.1 |

SOURCE: National Center for Education Statistics, High School and Beyond, 1987 High School Transcript Study, 1990 High School Transcript Study, and National Education Longitudinal Study of 1988.

Rates of participation did, however, vary across the subdivisions of the vocational curriculum. Participation in the occupationally specific curriculum was consistently higher than in the general labor market preparation and consumer and homemaking education curricula, and the level of participation remained relatively stable over the 10-year period, at about 87–89 percent of all graduates. Rates of participation in the general labor market preparation and the consumer and homemaking curricula, on the other hand, declined over this time.

In the general labor market preparation and the consumer and homemaking education curricula, both the rate of participation and the average number of credits completed diminished over time. By contrast, the proportion of students taking occupationally specific courses was unchanged over time, so the decline in the average number of credits completed by graduates is explained solely by a decline in the average number of courses completed by those who participated in this curriculum.[7]

Changes in composition of occupationally specific course taking, however, reflect shifts in both the rates of participation and the average number of credits completed at the different course levels. For example, average credits earned in occupationally specific courses that were part of a sequence of courses declined between 1982 and 1992, and so did rates of participation (table 2.3). The average number of credits completed in specialty

[7]In all of the tables in this report, average credits are calculated across all graduates who share the characteristic described by the row variable (in this case, all graduates). Hence, the average number of credits completed is jointly determined by the percentage of graduates exhibiting the characteristic who participated in a particular curricular area [the rate of participation] and the average number of credits completed by those participants [the intensity of participation]. The average number of credits completed in a particular curricular area by those who participated in that area can be calculated by dividing the average number of credits completed by the rate of participation. For example, those who participated in the general labor market preparation curriculum earned an average of 1.1 credits (0.7 ÷ 62.4% = 1.1), which is substantially more than the average number of credits completed when calculated across all graduates. Note that the closer the rate of participation is to 100 percent, the smaller is the difference in the estimates of average credits earned between participants and all graduates.

courses increased over time, as did the rate of participation (from 22.2 percent of graduates in 1982 to 38.2 percent of graduates in 1992). Thus, high school graduates continued to participate in the occupationally specific curriculum at the same rate in 1992 as they had in 1982 overall, but they completed fewer credits on average and the composition of their course taking shifted away from sequential courses and toward specialty courses.

**Table 2.3—Percentage of public high school graduates with credits in the occupationally specific vocational education curriculum, by course level: 1982–1992**

| Year of graduation | First course | Second course or higher | Specialty |
|---|---|---|---|
| 1982 | 79.4 | 46.4 | 22.2 |
| 1987 | 81.9 | 46.5 | 20.5 |
| 1990 | 78.1 | 36.9 | 26.2 |
| 1992 | 75.3 | 35.1 | 38.2 |

SOURCE: National Center for Education Statistics, High School and Beyond, 1987 High School Transcript Study, 1990 High School Transcript Study, and National Education Longitudinal Study of 1988.

## Course-Taking Trends by Student Characteristics

### *Course-Taking Trends by Gender*

The average number of credits completed in high school increased for both males and females, although females completed slightly more credits than did males in both 1982 and 1992 (table 2.4). The average number of credits completed by females in the academic curriculum increased from 14.4 in 1982 to 17.9 in 1992, while academic course taking among males rose from 13.9 to 16.8. The number of courses completed in the vocational curriculum declined for both groups, but the decline in vocational course taking was larger among females than among males. In 1982, females completed an average of 4.7 vocational credits, and males completed an average of 4.6 vocational credits (this difference is not statistically significant). In 1992, males earned an average of 3.9 credits, while females earned 3.6. Males also consistently completed more credits in the personal use curriculum than did females.

Table 2.4—Average number of credits earned by public high school graduates in the academic, vocational, and personal use curricula and in the vocational subcurricula, by selected student characteristics: 1982 and 1992

| Year of graduation and student characteristics | Average credits earned in | | | | Vocational credits earned in | | | Occupationally specific credits by sequence | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | Academic | Vocational | Personal use | General labor market preparation | Consumer and homemaking education | Occupationally specific education | First course | Second course or higher | Specialty |
| **1982** | | | | | | | | | | |
| Total | 21.4 | 14.2 | 4.6 | 2.6 | 1.1 | 0.7 | 2.9 | 1.8 | 0.9 | 0.2 |
| Gender | | | | | | | | | | |
| Male | 21.3 | 13.9 | 4.6 | 2.8 | 1.0 | 0.3 | 3.3 | 2.1 | 1.0 | 0.3 |
| Female | 21.6 | 14.4 | 4.7 | 2.5 | 1.1 | 1.0 | 2.5 | 1.5 | 0.8 | 0.2 |
| Race-ethnicity | | | | | | | | | | |
| American Indian | 21.3 | 13.3 | 5.1 | 2.9 | 1.3 | 0.5 | 3.3 | 2.2 | 0.9 | 0.3 |
| Asian | 22.2 | 16.0 | 3.1 | 3.1 | 1.0 | 0.3 | 1.9 | 1.2 | 0.5 | 0.2 |
| Black, non-Hispanic | 21.1 | 13.7 | 4.8 | 2.6 | 1.1 | 0.9 | 2.8 | 1.7 | 0.9 | 0.3 |
| Hispanic | 21.2 | 13.0 | 5.3 | 2.9 | 1.2 | 0.9 | 3.2 | 2.0 | 1.0 | 0.2 |
| White, non-Hispanic | 21.5 | 14.4 | 4.5 | 2.6 | 1.0 | 0.6 | 2.9 | 1.8 | 0.9 | 0.2 |
| Parents' educational attainment | | | | | | | | | | |
| Less than high school graduate | 21.2 | 13.0 | 5.5 | 2.7 | 1.2 | 0.9 | 3.4 | 2.0 | 1.1 | 0.3 |
| High school graduate | 21.3 | 13.3 | 5.4 | 2.6 | 1.2 | 0.8 | 3.4 | 2.1 | 1.0 | 0.3 |
| Some postsecondary | 21.5 | 14.4 | 4.5 | 2.7 | 1.1 | 0.6 | 2.8 | 1.7 | 0.8 | 0.2 |
| Bachelor's degree | 21.7 | 15.8 | 3.3 | 2.6 | 0.9 | 0.4 | 2.0 | 1.2 | 0.6 | 0.2 |
| Advanced degree | 21.9 | 16.2 | 3.1 | 2.6 | 0.8 | 0.4 | 1.9 | 1.2 | 0.6 | 0.2 |

**Table 2.4—Average number of credits earned by public high school graduate in the academic, vocational, and personal use curricula and in the vocational subcurricula, by selected student characteristics: 1982 and 1992—Continued**

| Year of graduation and student characteristics | Average credits earned in | | | | Vocational credits earned in | | | Occupationally specific credits by sequence | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | Academic | Vocational | Personal use | General labor market preparation | Consumer and homemaking education | Occupationally specific education | First course | Second course or higher | Specialty |
| **1992** | | | | | | | | | | |
| Total | 23.8 | 17.3 | 3.8 | 2.7 | 0.7 | 0.5 | 2.5 | 1.5 | 0.7 | 0.4 |
| Gender | | | | | | | | | | |
| Male | 23.6 | 16.8 | 3.9 | 2.9 | 0.7 | 0.4 | 2.9 | 1.7 | 0.8 | 0.4 |
| Female | 23.9 | 17.9 | 3.6 | 2.5 | 0.7 | 0.7 | 2.2 | 1.3 | 0.5 | 0.4 |
| Race-ethnicity | | | | | | | | | | |
| American Indian | 23.4 | 15.9 | 4.5 | 3.0 | 0.7 | 0.5 | 3.4 | 2.0 | 1.0 | 0.4 |
| Asian | 24.5 | 18.4 | 3.2 | 2.9 | 0.6 | 0.4 | 2.3 | 1.4 | 0.5 | 0.4 |
| Black, non-Hispanic | 23.2 | 16.6 | 3.9 | 2.7 | 0.7 | 0.7 | 2.5 | 1.6 | 0.6 | 0.4 |
| Hispanic | 23.6 | 16.8 | 3.8 | 3.0 | 0.7 | 0.5 | 2.6 | 1.4 | 0.7 | 0.5 |
| White, non-Hispanic | 23.8 | 17.5 | 3.7 | 2.6 | 0.7 | 0.5 | 2.5 | 1.5 | 0.7 | 0.4 |
| Parents' educational attainment | | | | | | | | | | |
| Less than high school graduate | 23.3 | 16.1 | 4.5 | 2.7 | 0.9 | 0.7 | 3.0 | 1.7 | 0.8 | 0.5 |
| High school graduate | 23.4 | 16.3 | 4.5 | 2.6 | 0.8 | 0.7 | 3.0 | 1.8 | 0.9 | 0.4 |
| Some postsecondary | 23.8 | 17.2 | 3.9 | 2.7 | 0.7 | 0.6 | 2.7 | 1.6 | 0.7 | 0.4 |
| Bachelor's degree | 24.1 | 18.7 | 2.8 | 2.6 | 0.5 | 0.4 | 1.9 | 1.1 | 0.4 | 0.3 |
| Advanced degree | 24.5 | 19.6 | 2.2 | 2.7 | 0.4 | 0.3 | 1.5 | 0.9 | 0.3 | 0.3 |

NOTE: Details may not sum to totals due to rounding.

SOURCE: National Center for Education Statistics, High School and Beyond, and National Education Longitudinal Study of 1988.

Course taking within the vocational curriculum also varied by gender. Occupationally specific course taking declined over time for both males and females, but males consistently earned more credits in this curriculum than did females. Furthermore, males completed more occupationally specific course credits in sequential courses than did females in 1982 and 1992.

Trends in course taking in the consumer and homemaking curriculum differed between males and females. The average number of credits completed by females in this curriculum declined from 1.0 credits in 1982 to 0.7 credits in 1992, while credits earned by males did not change between 1982 and 1992. Females continued to earn more credits in consumer and homemaking education than did males in 1992, but the difference was smaller than in 1982.

*Course-Taking Trends by Race-Ethnicity*

Graduates in all racial and ethnic categories completed more credits overall and more academic credits in 1992 than in 1982, but while the trends were relatively similar, patterns of academic and overall course taking varied by race-ethnicity (table 2.4). For example, Asian graduates typically earned more credits in the academic curriculum than did members of the other racial and ethnic groups.

Both enrollment trends and patterns of participation in the vocational curriculum differed by race-ethnicity, although patterns of participation tended to converge over time. Vocational course taking declined among Hispanics, blacks, and whites between 1982 and 1992, but was unchanged among American Indians and Asians over the same period. Compared to the members of the other groups, Asians earned relatively few vocational credits in 1982. However, because of the different trends in course taking among the racial and ethnic groups, vocational course taking among whites and Hispanics was not statistically different from vocational course taking among Asians in 1992, nor were there any statistically significant differences between whites, Hispanics, or blacks in the number of vocational credits completed in 1992.

*Course-Taking Trends by Parents' Education*

Course-taking trends were the same for all groups of graduates, irrespective of their parents' level of educational attainment (table 2.4). All groups of graduates earned more credits overall and more academic credits in 1992 than in 1982. At the same time, all groups of graduates earned fewer vocational credits in 1992 than their peers in 1982.

Despite the common trends, however, patterns of course taking among high school graduates varied by and were related to their parents' level of educational attainment. Higher levels of parental education were consistently related to higher levels of course taking overall, as well as to higher levels of academic course taking. Conversely, graduates whose parents had lower levels of education tended to earn more vocational credits than graduates whose parents had higher levels of education.

*Course-Taking Trends by Disability Status*

Because of significant differences in the way disability status is defined in High School and Beyond data and the other data sources, the 1982 disability status data cannot be reported with other data to mark trends. However, the definition of students with disabilities is relatively comparable in the three later transcript files, so it is possible to trace course taking by disabled and nondisabled students between 1987 and 1992.[8]

Between 1987 and 1992, course taking increased overall and in the academic curriculum regardless of disability status (table 2.5). Despite the similar trends, students with disabilities earned fewer total credits than nondisabled students in both 1987 and 1992. However, while the overall differences were fairly small, course taking differences between graduates with and without disabilities were much larger in the academic and vocational curricula. Graduates with disabilities consistently earned more vocational credits and fewer academic credits than those without disabilities, and the disparity in vocational course taking increased over time. Between 1987 and 1992, vocational credits earned by nondisabled graduates fell by 0.7, while the apparent decline in vocational courses taken by graduates with disabilities, from 6.0 credits in 1987 to 5.6 credits in 1992, was not statistically significant.

Graduates with and without disabilities also exhibited different trends in their occupationally specific course taking between 1987 and 1992. Among graduates with disabilities, credits earned in the occupationally specific curriculum did not change over these five years, nor did the number of credits earned in occupationally specific sequential courses. Course taking in the occupationally specific specialty courses increased slightly, however. In contrast, occupationally specific course taking declined from 2.9 to 2.5 credits overall among graduates without disabilities, and declines were evident in both the first course and the second or higher course in a sequence. But like graduates with disabilities, those without disabilities completed more credits in the specialty courses in 1992 than in 1987. Thus, graduates with no disabilities tended to take fewer courses within a structured sequence in 1992 than in 1982, while graduates with disabilities did not.

[8]Disability status for 1992 is based on a different reporting source in this report than in some other NCES reports that use the 1992 transcript data, such as *Vocational Education in the United States: the Early 1990s*. The variable used in this report classifies students as disabled only if their transcripts indicate participation in a special education program. For this reason, the disability status data for 1992 reported here will not match the disability status data in those other reports, although the enrollment patterns are much the same.

**Table 2.5—Average number of credits earned by public high school graduates in the academic, vocational, and personal use curricula and in the vocational subcurricula, by disability status: 1987 and 1992**

| Year of graduation and disability status | Average credits earned in | | | | Vocational credits earned in | | | Occupationally specific credits by sequence | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | Academic | Vocational | Personal use | General labor market preparation | Consumer and homemaking education | Occupationally specific education | First course | Second course or higher | Specialty |
| **1987** | | | | | | | | | | |
| Total | 22.8 | 15.6 | 4.4 | 2.7 | 0.9 | 0.6 | 2.9 | 1.8 | 0.9 | 0.2 |
| Has disability | 21.9 | 12.6 | 6.0 | 3.3 | 1.5 | 0.8 | 3.8 | 2.1 | 1.4 | 0.3 |
| No disability | 22.8 | 15.8 | 4.4 | 2.7 | 0.9 | 0.6 | 2.9 | 1.8 | 0.9 | 0.2 |
| **1992** | | | | | | | | | | |
| Total | 23.8 | 17.3 | 3.8 | 2.7 | 0.7 | 0.5 | 2.5 | 1.5 | 0.7 | 0.4 |
| Has disability | 23.2 | 14.2 | 5.6 | 3.4 | 1.0 | 0.8 | 3.8 | 2.2 | 1.1 | 0.4 |
| No disability | 23.8 | 17.4 | 3.7 | 2.7 | 0.7 | 0.5 | 2.5 | 1.5 | 0.6 | 0.4 |

NOTE: Details may not sum to total due to rounding.

SOURCE: National Center for Education Statistics, 1987 High School Transcript Study, and National Education Longitudinal Study of 1988.

*Course-Taking Trends by Limited-English-Proficiency (LEP) Status*

Unlike the other variables included in this report, the LEP status variable is available only for the 1992 graduates. Hence, this section describes the course-taking behavior of LEP versus non-LEP graduates in 1992, but no comparisons are made over time.

Both LEP and non-LEP graduates completed about the same number of credits in high school, but the distribution of those credits differed by LEP status (table 2.6). Non-LEP graduates completed more credits in the academic curriculum than LEP graduates (17.5 versus 16.3 credits), while LEP graduates completed more credits than non-LEP students in the personal use curriculum (3.2 versus 2.7 credits). However, there were no significant differences between these two groups in vocational course taking overall or within the different vocational curricula.

**Table 2.6—Average number of credits earned by public high school graduates in the academic, vocational, and personal use curricula and in the vocational subcurricula, by LEP status: 1992**

| | Average credits earned in | | | | Vocational credits earned in | | |
|---|---|---|---|---|---|---|---|
| LEP status | Total | Academic | Vocational | Personal use | General labor market preparation | Consumer and homemaking education | Occupationally specific education |
| Total | 23.8 | 17.3 | 3.8 | 2.7 | 0.7 | 0.5 | 2.5 |
| LEP | 23.7 | 16.3 | 4.2 | 3.2 | 0.7 | 0.6 | 2.9 |
| Non-LEP | 23.8 | 17.5 | 3.7 | 2.7 | 0.7 | 0.5 | 2.5 |

NOTE: Details may not sum to total due to rounding.

SOURCE: National Center for Education Statistics, National Education Longitudinal Study of 1988.

*Summary of General Trends*

To briefly summarize, then, academic course taking increased among high school graduates between 1982 and 1992, vocational course taking declined, and course taking in the personal use curriculum was unchanged. However, the increases in academic course taking were larger than the declines in vocational course taking, so the total number of credits completed by graduates went up. These same trends were shared by most student groups, although the downward trends in vocational course taking were not evident among American Indians, Asians, and graduates with disabilities.

# Chapter 3

# Trends in Levels of Vocational Participation and the Relationship Between Academic and Vocational Course Taking

Chapter 2 showed that almost all students completed some vocational course work in 1992, despite declining average levels of participation over time. At the same time, almost all students completed a majority of their credits in the academic curriculum regardless of the number of vocational credits they completed. For example, even among those high school graduates who were most committed to the vocational curriculum (those who completed 8.0 or more credits), less than half of all their credits (about 39 percent) were completed in vocational education in 1992 (down from about 43 percent of their credits in 1982). Since participation in the vocational curriculum is almost universal and virtually all students take a majority of their credits in the academic curriculum, it is useful to look not just at the average amount of vocational education that students take, but also at the range of variation in vocational participation as well as the level of their participation.

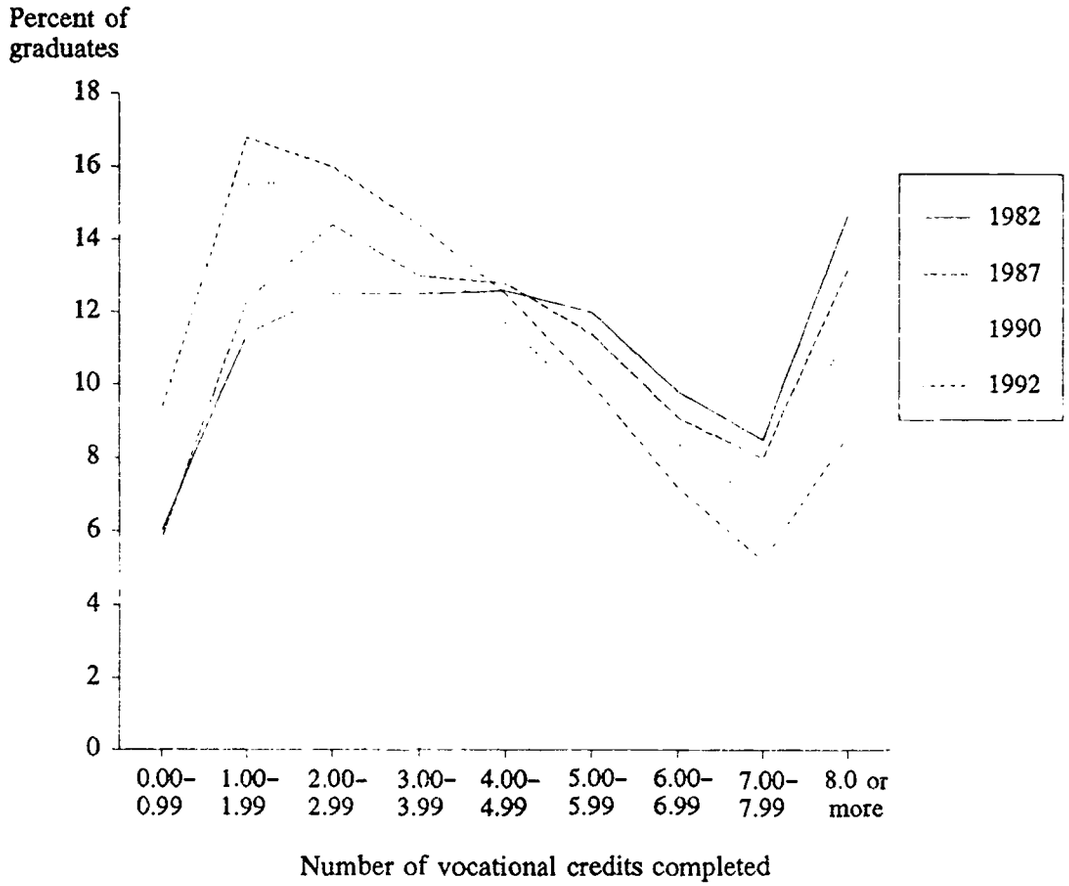
This chapter looks at two measures of vocational participation among public high school graduates. The first is the intensity of vocational participation—measured by the percentage distribution of high school graduates by the number of credits completed in vocational education overall and in the occupationally specific education curriculum—and the second is the degree of course concentration within specific vocational fields—measured by the percentage of graduates who completed 3.0 or more credits in a single occupationally specific vocational field. Finally, the chapter examines the relationship between academic and vocational course taking among high school graduates, and how academic course taking varied in relation to the number of vocational credits earned.

## Trends in the Intensity of Vocational Course Taking

### *Overall Vocational Course Taking*

The proportion of high school graduates who participated in secondary vocational education fell only slightly between 1982 and 1992; therefore, most of the decline in the average number of vocational credits completed is explained by a widespread decline in the average number of vocational credits earned. This downward shift is illustrated in figure 3.1, which shows that the percentage of students who completed more than about 4 credits declined after 1982, while the percentage earning fewer than about 4 credits increased after 1982. Thus, high school graduates tended toward less intensive participation in the vocational curriculum in 1992 than in 1982, yet the percentage of graduates who took no vocational credits increased only slightly over time.

**Figure 3.1—Percentage distribution of public high school graduates according to the number of vocational credits completed: 1982–1992**




NOTE: Data for this figure are presented in appendix A, table A6

SOURCE: National Center for Education Statistics, High School and Beyond, 1987 High School Transcript Study, 1990 High School Transcript Study, and National Education Longitudinal Study of 1988.

Downward trends in the intensity of vocational course taking were shared by both males and females between 1982 and 1992 (table 3.1), although the strength of these trends differed by gender. While the distribution of males and females by the number of vocational credits completed in 1982 did not differ, in 1992 a larger percentage of males than females earned 4 or more vocational credits.

Table 3.1—Percentage distribution of public high school graduates according to the number of credits earned in vocational education, by gender, race-ethnicity, and parents' educational attainment: 1982 and 1992

| Year of graduation and student characteristics | 0.00–0.99 | 1.00–1.99 | 2.00–2.99 | 3.00–3.99 | 4.00–4.99 | 5.00–5.99 | 6.00–6.99 | 7.00–7.99 | 8.00 or more |
|---|---|---|---|---|---|---|---|---|---|
| **1982** | | | | | | | | | |
| Total | 6.0 | 11.4 | 12.5 | 12.5 | 12.6 | 12.0 | 9.8 | 8.5 | 14.7 |
| Gender | | | | | | | | | |
| Male | 6.1 | 11.4 | 12.9 | 12.3 | 13.4 | 11.8 | 8.7 | 9.0 | 14.5 |
| Female | 6.0 | 11.3 | 12.1 | 12.8 | 11.8 | 12.3 | 10.9 | 8.0 | 14.9 |
| Race–ethnicity | | | | | | | | | |
| American Indian | 3.3 | 7.2 | 10.9 | 9.0 | 10.1 | 21.0 | 17.8 | 8.9 | 11.9 |
| Asian | 12.1 | 20.1 | 19.1 | 14.4 | 13.4 | 7.8 | 5.3 | 3.4 | 4.4 |
| Black, non-Hispanic | 1.9 | 9.8 | 11.9 | 12.7 | 16.2 | 15.2 | 10.7 | 7.7 | 13.9 |
| Hispanic | 2.5 | 7.8 | 11.3 | 11.1 | 14.3 | 11.6 | 12.6 | 9.6 | 19.2 |
| White, non-Hispanic | 7.2 | 12.0 | 12.6 | 12.8 | 11.8 | 11.7 | 9.1 | 8.4 | 14.4 |
| Parents' educational attainment | | | | | | | | | |
| Less than high school graduate | 1.7 | 6.9 | 7.7 | 10.9 | 13.4 | 13.5 | 13.8 | 12.2 | 20.1 |
| High school graduate | 3.4 | 7.1 | 9.7 | 11.7 | 12.7 | 12.3 | 10.8 | 11.4 | 20.9 |
| Some postsecondary | 5.8 | 11.6 | 13.6 | 13.6 | 13.8 | 13.3 | 8.7 | 6.9 | 12.8 |
| Bachelor's degree | 12.2 | 19.6 | 17.2 | 14.0 | 10.4 | 11.1 | 6.9 | 4.1 | 4.6 |
| Advanced degree | 13.8 | 20.9 | 19.6 | 13.7 | 10.0 | 7.9 | 5.8 | 3.1 | 5.1 |
| **1992** | | | | | | | | | |
| Total | 9.3 | 16.8 | 16.0 | 14.4 | 12.5 | 10.0 | 7.2 | 5.2 | 8.6 |
| Gender | | | | | | | | | |
| Male | 8.2 | 14.9 | 15.9 | 15.5 | 12.6 | 10.7 | 7.2 | 6.0 | 9.1 |
| Female | 10.6 | 18.8 | 16.2 | 13.6 | 12.5 | 9.3 | 7.2 | 4.2 | 7.7 |
| Race–ethnicity | | | | | | | | | |
| American Indian | 4.6 | 5.9 | 16.1 | 17.2 | 18.2 | 11.5 | 7.3 | 9.3 | 9.8 |
| Asian | 14.5 | 21.6 | 14.2 | 12.6 | 14.5 | 8.8 | 5.3 | 2.6 | 6.0 |
| Black, non-Hispanic | 5.5 | 11.2 | 17.9 | 15.8 | 16.8 | 12.6 | 8.3 | 5.8 | 6.1 |
| Hispanic | 6.5 | 17.5 | 16.1 | 14.5 | 13.5 | 11.0 | 8.4 | 6.6 | 5.9 |
| White, non-Hispanic | 10.2 | 17.5 | 15.9 | 14.4 | 11.5 | 9.5 | 7.0 | 4.9 | 9.2 |
| Parents' educational attainment | | | | | | | | | |
| Less than high school graduate | 4.8 | 8.7 | 13.9 | 13.1 | 17.8 | 13.7 | 9.9 | 6.5 | 11.7 |
| High school graduate | 3.4 | 11.4 | 15.7 | 14.4 | 12.9 | 12.3 | 9.3 | 7.6 | 13.0 |
| Some postsecondary | 8.1 | 14.8 | 16.1 | 15.2 | 13.6 | 10.1 | 7.7 | 5.2 | 9.2 |
| Bachelor's degree | 14.5 | 23.0 | 18.2 | 17.3 | 11.1 | 6.8 | 3.4 | 2.8 | 2.9 |
| Advanced degree | 22.8 | 29.2 | 18.1 | 12.9 | 7.4 | 4.7 | 1.9 | 1.7 | 1.3 |

NOTE: Percentages may not sum to 100 percent due to rounding.

SOURCE: National Center for Education Statistics, High School and Beyond, and National Education Longitudinal Study of 1988.

Trends in the distribution of students by the number of vocational credits completed also varied by race-ethnicity (table 3.1). Whites, blacks, and Hispanics all participated less intensively in the vocational curriculum in 1992 than in 1982, while the level of intensity in

vocational participation among Asians and American Indians did not change significantly over this period.

The downward trends in vocational credits between 1982 and 1992 were shared by graduates at all levels of parents' educational attainment. Despite the similar downward trends, the intensity of vocational participation varied by parents' level of educational attainment in both 1982 and 1992. Graduates whose parents had lower levels of educational attainment consistently participated in the vocational curriculum to a greater degree than did graduates whose parents had higher levels of educational attainment.

Table 3.2 shows the percentage distribution of graduates with and without disabilities in 1987 and 1992. The distribution of graduates with disabilities by the number of credits completed in vocational education did not change between 1987 and 1992. By contrast, the distribution of nondisabled graduates by the number of vocational credits shifted downward, as a smaller percentage of students completed 5 or more vocational credits.

**Table 3.2—Percentage distribution of public high school graduates according to the number of credits earned in vocational education, by disability status: 1987 and 1992**

| Year of graduation and disability status | 0.00-0.99 | 1.00-1.99 | 2.00-2.99 | 3.00-3.99 | 4.00-4.99 | 5.00-5.99 | 6.00-6.99 | 7.00-7.99 | 8.00 or more |
|---|---|---|---|---|---|---|---|---|---|
| **1987** | | | | | | | | | |
| Total | 5.8 | 12.3 | 14.4 | 13.0 | 12.8 | 11.4 | 9.1 | 8.0 | 13.2 |
| Has disability | 1.6 | 5.0 | 6.6 | 9.4 | 11.8 | 14.0 | 12.5 | 13.0 | 26.3 |
| No disability | 6.0 | 12.6 | 14.7 | 13.1 | 12.9 | 11.4 | 8.9 | 7.9 | 12.7 |
| **1992** | | | | | | | | | |
| Total | 9.3 | 16.8 | 16.0 | 14.4 | 12.5 | 10.0 | 7.2 | 5.2 | 8.6 |
| Has disability | 3.0 | 5.5 | 11.8 | 11.0 | 10.7 | 11.0 | 10.3 | 13.3 | 23.5 |
| No disability | 9.5 | 17.1 | 16.1 | 14.6 | 12.6 | 10.0 | 7.1 | 4.9 | 8.1 |

NOTE: Percentages may not sum to 100 percent due to rounding.

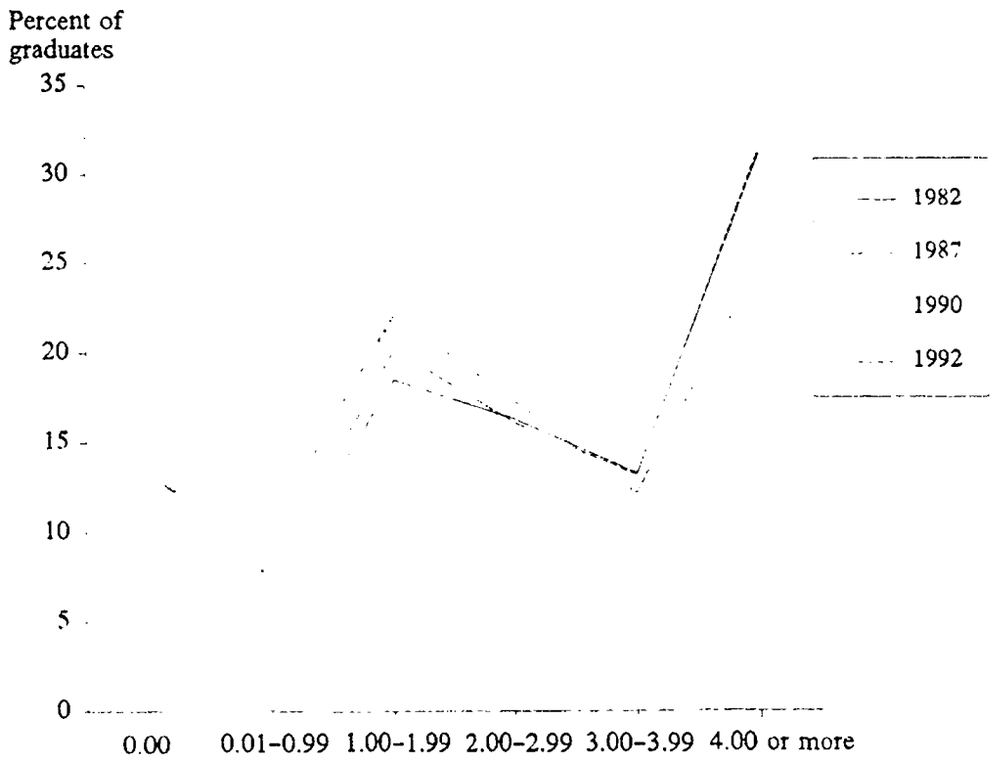
SOURCE: National Center for Education Statistics. 1987 High School Transcript Study, and National Education Longitudinal Study of 1988.

*Course Taking in the Occupationally Specific Education Curriculum*

Between 1982 and 1992, the distribution of graduates by the number of occupationally specific vocational education credits they completed also shifted downward, although trends were much less pronounced than for vocational course taking overall (figure 3.2). The intensity of occupationally specific course taking also fell among both males and females, while changes in levels of participation varied by some of the other student characteristics shown in table 3.3. For example, levels of participation in the occupationally specific curriculum shifted downward among whites and Hispanics, but not among Asians, blacks, or American Indians. The same was true among graduates by their parents' level of educational

attainment. The intensity of participation dropped among graduates whose parents had completed high school only, or who had completed an advanced degree but not among the other groups.

**Figure 3.2—Percentage distribution of public high school graduates according to the number of occupationally specific credits completed: 1982–1992**




NOTE: Data for this figure are presented in appendix A, table A10.

SOURCE: National Center for Education Statistics, High School and Beyond, 1987 High School Transcript Study, 1990 High School Transcript Study, and National Education Longitudinal Study of 1988.

Table 3.3—Percentage distribution of public high school graduates according to the number of credits earned in occupationally specific courses, by gender, race–ethnicity, and parents' educational attainment: 1982 and 1992

| Year of graduation and student characteristics | 0.00 | 0.01–0.99 | 1.00–1.99 | 2.00–2.99 | 3.00–3.99 | 4.00 or more |
|---|---|---|---|---|---|---|
| 1982 | | | | | | |
| Total | 13.5 | 7.3 | 18.5 | 16.3 | 13.3 | 31.2 |
| Gender | | | | | | |
| Male | 10.6 | 6.6 | 16.5 | 15.6 | 14.0 | 36.8 |
| Female | 16.1 | 8.0 | 20.4 | 17.0 | 12.6 | 25.9 |
| Race–ethnicity | | | | | | |
| American Indian | 7.0 | 3.9 | 17.2 | 12.0 | 15.8 | 44.1 |
| Asian | 23.2 | 9.0 | 22.1 | 17.4 | 11.3 | 17.0 |
| Black, non-Hispanic | 12.6 | 7.0 | 18.9 | 17.9 | 14.2 | 29.4 |
| Hispanic | 10.4 | 6.5 | 17.0 | 15.8 | 16.2 | 34.2 |
| White, non-Hispanic | 14.0 | 7.4 | 18.7 | 16.3 | 12.7 | 30.9 |
| Parents' educational attainment | | | | | | |
| Less than high school graduate | 8.1 | 3.7 | 15.5 | 16.7 | 16.6 | 39.5 |
| High school graduate | 9.1 | 6.5 | 15.8 | 16.0 | 13.5 | 39.1 |
| Some postsecondary | 14.1 | 7.2 | 19.7 | 16.3 | 13.7 | 29.0 |
| Bachelor's degree | 20.3 | 11.1 | 22.3 | 17.6 | 11.9 | 16.9 |
| Advanced degree | 24.5 | 10.0 | 24.4 | 16.1 | 9.9 | 15.1 |
| 1992 | | | | | | |
| Total | 12.9 | 10.3 | 22.2 | 17.3 | 12.2 | 25.0 |
| Gender | | | | | | |
| Male | 10.9 | 7.4 | 20.4 | 18.4 | 12.9 | 30.1 |
| Female | 15.0 | 13.4 | 24.1 | 16.2 | 11.7 | 19.8 |
| Race–ethnicity | | | | | | |
| American Indian | 8.5 | 6.3 | 17.1 | 13.4 | 17.2 | 37.5 |
| Asian | 14.7 | 10.8 | 26.5 | 14.2 | 14.3 | 19.7 |
| Black, non-Hispanic | 11.5 | 8.0 | 21.1 | 21.5 | 12.1 | 25.9 |
| Hispanic | 10.4 | 10.4 | 22.7 | 16.2 | 11.1 | 29.2 |
| White, non-Hispanic | 13.5 | 10.8 | 22.2 | 17.0 | 12.3 | 24.2 |
| Parents' educational attainment | | | | | | |
| Less than high school graduate | 9.1 | 5.1 | 19.2 | 16.9 | 17.7 | 32.2 |
| High school graduate | 8.3 | 5.8 | 23.3 | 17.1 | 13.8 | 31.8 |
| Some postsecondary | 11.4 | 9.6 | 21.0 | 18.5 | 12.3 | 27.1 |
| Bachelor's degree | 18.6 | 14.0 | 24.7 | 17.4 | 11.1 | 14.2 |
| Advanced degree | 24.1 | 15.0 | 27.2 | 17.0 | 8.2 | 8.4 |

NOTE: Percentages may not sum to 100 percent due to rounding.

SOURCE: National Center for Education Statistics, High School and Beyond, and National Education Longitudinal Study of 1988

As one would expect given the other measures of vocational course taking, the intensity of occupationally specific enrollments by graduates with disabilities was unchanged between 1987 and 1992 (table 3.4). However, nondisabled graduates participated less intensively in the occupationally specific curriculum in 1992 than in 1987.

**Table 3.4—Percentage distribution of public high school graduates according to the number of credits earned in occupationally specific courses, by disability status: 1987 and 1992**

| Year of graduation and disability status | 0.00 | 0.01–0.99 | 1.00–1.99 | 2.00–2.99 | 3.00–3.99 | 4.00 or more |
|---|---|---|---|---|---|---|
| **1987** | | | | | | |
| Total | 11.5 | 7.6 | 20.2 | 16.1 | 13.2 | 31.5 |
| Has disability | 9.7 | 4.6 | 14.6 | 12.7 | 10.7 | 47.7 |
| No disability | 11.6 | 7.7 | 20.4 | 16.2 | 13.2 | 30.9 |
| **1992** | | | | | | |
| Total | 12.9 | 10.3 | 22.2 | 17.3 | 12.2 | 25.0 |
| Has disability | 6.6 | 6.3 | 15.1 | 14.9 | 11.3 | 45.8 |
| No disability | 13.1 | 10.5 | 22.4 | 17.4 | 12.3 | 24.4 |

NOTE: Percentages may not sum to 100 percent due to rounding.

SOURCE: National Center for Education Statistics, 1987 High School Transcript Study, and National Education Longitudinal Study of 1988.

## Trends in Vocational Concentration

Whereas the distribution of students by the number of vocational or occupationally specific credits completed describes students' overall level of participation, "vocational concentration" refers to the extent to which students took a series of linked courses that might constitute a coherent program. Students who concentrated in a vocational program are identified as those students who completed three or more courses in a single occupationally specific field.[9] The previous section illustrated that the intensity of participation by high school graduates in the occupationally specific vocational curriculum declined between 1982 and 1992; this section takes the analysis one step further and examines whether the declining intensity of participation was matched with declining levels of concentration within the various vocational fields.

Table 3.5 shows that the rate at which students concentrated in a vocational field declined significantly over time. In 1982, 33.7 percent of all high school graduates had a concentration in a vocational program area, but by 1992 the group of concentrators had declined to 24.4 percent of all graduates. However, declines in the rate of concentration were

[9]These courses can be at the level of the first course in a sequence, the second or higher course in a sequence, or specialty courses, although there is no way to determine from the transcripts whether the courses taken by a particular student actually constitute a coherent program.

confined to the two largest vocational fields. The percentage of graduates concentrating in trade and industry fell from 15.3 percent in 1982 to 10.3 percent in 1992, and the percentage of graduates concentrating in business fell from 11.9 percent in 1982 to 7.7 percent in 1992. The percentage of high school graduates concentrating in the other five fields did not change between 1982 and 1992.

**Table 3.5—Percentage of public high school graduates concentrating (earning 3.0 or more credits) in each occupationally specific field: 1982–1992**

| Year of graduation | Total vocational concentrators | Vocational concentration by field | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Agriculture | Business | Marketing | Health | Occupational home economics | Trade and industry | Technical/ communi-cations |
| 1982 | 33.7 | 3.0 | 11.9 | 2.0 | 0.6 | 1.9 | 15.3 | 0.4 |
| 1987 | 32.2 | 2.9 | 10.8 | 2.2 | 1.0 | 2.5 | 13.5 | 0.8 |
| 1990 | 27.5 | 2.9 | 8.9 | 2.4 | 0.6 | 2.2 | 11.7 | 0.4 |
| 1992 | 24.4 | 2.5 | 7.7 | 1.5 | 0.6 | 2.1 | 10.3 | 0.6 |

NOTE: A small percentage of students concentrate in more than one field, so the field columns do not sum to the total column.

SOURCE: National Center for Education Statistics, High School and Beyond, 1987 High School Transcript Study, 1990 High School Transcript Study, and National Education Longitudinal Study of 1988.

Two areas of particular interest, given the emphasis in the Perkins Act on high technology education, are trade and industry (which includes precision production) and technical and communications. Trends in these vocational fields suggest that the Perkins Act goal of increasing participation in applied technology programs has not been advanced over the 10-year period between 1982 and 1992, although most of this period preceded the effective date of the Act. As already noted, trade and industry experienced steep declines in the rate of vocational concentration, while the rate of concentration in technical and communica s, very low to begin with, was unchanged over time.

Both males and females were less likely to complete three or more credits in a single vocational field in 1992 than in 1982 (table 3.5), but while the overall trends were the same, the patterns of vocational concentration in each year varied by gender. For example, the percentage of 1992 male graduates who concentrated in agriculture was much higher than the percentage of females who met this criterion. Similarly, the percentage of males who concentrated in trade and industry was markedly higher than the percentage of females who concentrated in trade and industry in both 1982 and 1992. The opposite pattern of concentration was evident in business. In 1982, almost 21 percent of female graduates concentrated in business, which includes secretarial and other business support fields, compared with 2.5 percent of males. In 1992, females were still more likely to concentrate in business than were males, but the difference was much smaller.

**Table 3.6—Percentage of public high school graduates concentrating (earning 3.0 or more credits) in each occupationally specific field, by gender, race-ethnicity, and parents' educational attainment: 1982 and 1992**

| Year of graduation and student characteristics | Total vocational concentrators | Vocational concentration by field | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Agriculture | Business | Marketing | Health | Occupational home economics | Trade and industry | Technical/ communi-cations |
| **1982** | | | | | | | | |
| Total | 33.7 | 3.0 | 11.9 | 2.0 | 0.6 | 1.9 | 15.3 | 0.4 |
| Gender | | | | | | | | |
| Male | 38.8 | 5.5 | 2.5 | 1.7 | 0.2 | 0.6 | 30.0 | 0.6 |
| Female | 28.9 | 0.7 | 20.8 | 2.3 | 1.0 | 3.1 | 1.6 | 0.3 |
| Race-ethnicity | | | | | | | | |
| American Indian | 46.9 | 2.1 | 7.5 | 1.0 | 0.9 | 1.5 | 35.0 | 0.0 |
| Asian | 17.5 | 0.5 | 4.2 | 0.4 | 0.0 | 0.3 | 11.1 | 1.1 |
| Black, non-Hispanic | 32.9 | 0.9 | 11.6 | 3.4 | 1.5 | 1.9 | 14.3 | 0.4 |
| Hispanic | 38.2 | 3.2 | 11.1 | 2.1 | 1.0 | 2.0 | 20.3 | 0.2 |
| White, non-Hispanic | 33.1 | 3.4 | 12.3 | 1.8 | 0.4 | 1.9 | 14.4 | 0.5 |
| Parents' educational attainment | | | | | | | | |
| Less than high school graduate | 43.2 | 2.6 | 17.4 | 2.9 | 1.3 | 4.2 | 15.8 | 0.9 |
| High school graduate | 40.7 | 3.7 | 13.9 | 2.6 | 0.6 | 2.1 | 19.6 | 0.5 |
| Some postsecondary | 32.2 | 3.5 | 12.4 | 1.4 | 0.5 | 1.6 | 13.9 | 0.3 |
| Bachelor's degree | 19.5 | 2.2 | 5.8 | 1.2 | 0.4 | 0.8 | 9.6 | 0.1 |
| Advanced degree | 17.3 | 1.0 | 5.9 | 1.8 | 0.3 | 0.4 | 7.8 | 0.5 |
| **1992** | | | | | | | | |
| Total | 24.4 | 2.5 | 7.7 | 1.5 | 0.6 | 2.1 | 10.3 | 0.6 |
| Gender | | | | | | | | |
| Male | 28.1 | 4.1 | 3.6 | 1.4 | 0.1 | 0.8 | 18.6 | 0.9 |
| Female | 20.3 | 0.8 | 11.9 | 1.7 | 1.1 | 3.2 | 1.9 | 0.3 |
| Race-ethnicity | | | | | | | | |
| American Indian | 35.7 | 3.7 | 2.2 | 0.9 | 0.5 | 4.6 | 25.6 | 0.0 |
| Asian | 21.1 | 0.4 | 7.0 | 0.6 | 1.3 | 0.1 | 12.0 | 0.1 |
| Black, non-Hispanic | 24.2 | 1.0 | 8.3 | 2.0 | 0.6 | 5.3 | 7.0 | 0.5 |
| Hispanic | 24.1 | 1.0 | 9.2 | 1.1 | 0.6 | 2.8 | 9.3 | 1.0 |
| White, non-Hispanic | 24.1 | 3.0 | 7.7 | 1.6 | 0.6 | 1.5 | 10.3 | 0.6 |
| Parents' educational attainment | | | | | | | | |
| Less than high school graduate | 29.6 | 2.9 | 10.8 | 1.7 | 1.4 | 3.4 | 10.0 | 0.4 |
| High school graduate | 31.8 | 3.5 | 9.5 | 1.4 | 0.9 | 2.5 | 14.4 | 1.0 |
| Some postsecondary | 25.5 | 2.8 | 8.5 | 1.7 | 0.5 | 1.8 | 10.6 | 0.5 |
| Bachelor's degree | 14.4 | 1.5 | 4.5 | 1.0 | 0.3 | 0.6 | 6.3 | 0.5 |
| Advanced degree | 8.9 | 0.7 | 3.4 | 0.8 | 0.1 | 0.5 | 3.1 | 0.9 |

NOTE: A small percentage of students concentrate in more than one field, so the field columns do not sum to the total column. Zeros in the table indicate that no students concentrated in the particular field designated.

SOURCE: National Center for Education Statistics, High School and Beyond, and National Education Longitudinal Study of 1988.

Disparities in the rates of concentration between males and females declined substantially between 1982 and 1992 in business and in trade and industry, which is in keeping with the Perkins Act goal of improving gender balance in specific fields. However, the smaller disparity in trade and industry largely was due to the rapid decline in the percentage of males who concentrated in this field, while the smaller disparity in business was due mostly to the declining rate of participation by females in this field. Hence, the Perkins Act goal of increasing the percentage of students who were concentrating in programs that are nontraditional for their gender was not advanced much at all over this period.

Although the overall trend in the rate of vocational concentration was downward between 1982 and 1992, the trends varied by race-ethnicity (table 3.6). Whites, Hispanics, and blacks were less likely to concentrate in a vocational field in 1992 than in 1982, but the percentages of Asians and American Indians concentrating in a vocational program area did not differ in 1992 from 1982. Because of these disparate trends among the different racial and ethnic groups, 1992 graduates in each racial-ethnic group were about equally likely to concentrate in a vocational field.[10]

The strong inverse relationship between the parents' educational attainment and the level of graduates' participation in vocational education was clearly evident in the rates of vocational concentration (table 3.6). Graduates whose parents had lower levels of educational attainment were more likely to concentrate in a vocational field than were those whose parents had higher levels of attainment in both 1982 and 1992. For instance, 43.2 percent of those graduates whose parents had not completed high school concentrated in a vocational field in 1982, compared with 17.3 percent of graduates whose parents had an advanced degree. Large differences between groups were still apparent in 1992 as well, when 29.6 percent of graduates whose parents had not graduated from high school and 8.9 percent of graduates whose parents had completed an advanced degree concentrated in vocational education.

Table 3.7 shows the percentage of graduates with and without disabilities who concentrated in an occupationally specific field in 1987 and 1992. Rates of vocational concentration declined among graduates with no disabilities over this period, but graduates with disabilities were just as likely to be vocational concentrators in 1992 as they had been in 1987. Furthermore, because of the different trends among groups by disability status, the difference in the rate of concentration between them was larger in 1992 than in 1987.

[10]This is one instance where the within-group trends were sufficiently different to make the between-group differences change over time. Asians were less likely than members of the other racial and ethnic groups to have completed 3.0 or more credits in a single vocational field in 1982, but by 1992 there were no significant differences in rates of concentration among the different groups.

Table 3.7—Percentage of public high school graduates concentrating (earning 3.0 or more credits) in each occupationally specific field, by disability status: 1987 and 1992

| Year of graduation and disability status | Total vocational concentrators | Vocational concentration by field | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Agriculture | Business | Marketing | Health | Occupational home economics | Trade and industry | Technical/ communi-cations |
| **1987** | | | | | | | | |
| Total | 32.2 | 2.9 | 10.8 | 2.2 | 1.0 | 2.5 | 13.5 | 0.8 |
| Has disability | 43.7 | 6.5 | 3.6 | 2.7 | 1.5 | 5.8 | 26.2 | 0.7 |
| No disability | 31.8 | 2.8 | 11.1 | 2.2 | 1.0 | 2.4 | 13.0 | 0.8 |
| **1992** | | | | | | | | |
| Total | 24.4 | 2.5 | 7.7 | 1.5 | 0.6 | 2.1 | 10.3 | 0.6 |
| Has disability | 45.1 | 9.5 | 5.3 | 0.7 | 0.4 | 7.1 | 25.5 | - |
| No disability | 23.7 | 2.3 | 7.8 | 1.6 | 0.7 | 1.9 | 9.8 | 0.6 |

-Less than .05 percent.

NOTE: A small percentage of students concentrate in more than one field, so the field columns do not sum to the total column.

SOURCE: National Center for Education Statistics, 1987 High School Transcript Study, and National Education Longitudinal Study of 1988.

## Relationship Between Vocational and Academic Course Taking

The main emphasis of this report has been vocational course taking, yet virtually all high school graduates, regardless of the number of vocational credits earned, completed a majority of their credits in the academic curriculum. At the same time, many students whose orientation was clearly academic completed credits in the vocational curriculum, including credits in the occupationally specific segments of that curriculum. For this reason, it is useful to look at the interrelationships between academic and vocational course taking.

Table 3.8 shows how academic course taking overall and in selected subject areas varied with the number of vocational credits completed. Several features of the relationship between academic and vocational course taking stand out. First, regardless of the number of vocational credits completed, high school graduates earned more academic credits overall and in each subject area in 1992 than in 1982.

Second, as the number of vocational credits completed by graduates increased, the amount of academic course taking overall and in each subject area declined. This pattern was pronounced in 1982, and was just as pronounced in 1992. However, it is not an unexpected relationship. Students have only so much time to take courses in high school, and if participation in one part of the high school curriculum increases, participation in other parts is likely to decline.

Third, the size of the difference between groups in the number of academic credits completed varied by academic subject area. For example, high school graduates who

completed fewer than 2 vocational credits earned about half a credit more in English than did graduates who completed 8 or more vocational credits, and this difference was consistent over time. By contrast, graduates who earned fewer than 2 vocational credits in 1982 completed almost twice as many math and science credits on average as did those graduates who completed 8 or more vocational credits in 1982. But unlike English, where the difference between groups did not change, the differences in math and in science course taking between these groups declined from 1982 to 1992.[11]

A different pattern was evident in advanced course taking in English, math, and science, however. While the differences between vocational credit groups was consistently small in English and declining in math and science overall between 1982 and 1992, the differences between these groups increased in advanced English over time, and remained very large in advanced math and advanced science over the whole period.

**Table 3.8—Average number of credits earned by public high school graduates in selected academic fields, by number of credits earned in vocational education: 1982 and 1992**

| Year of graduation and number of vocational credits | Total academic | All English | Advanced English | All math | Advanced math | All science | Advanced science |
|---|---|---|---|---|---|---|---|
| **1982** | | | | | | | |
| Total | 14.2 | 3.9 | 0.2 | 2.6 | 0.6 | 2.2 | 0.5 |
| 0.00–1.99 | 18.1 | 4.1 | 0.5 | 3.4 | 1.3 | 3.0 | 1.2 |
| 2.00–3.99 | 15.7 | 4.0 | 0.3 | 2.9 | 0.8 | 2.5 | 0.7 |
| 4.00–5.99 | 13.5 | 3.8 | 0.2 | 2.4 | 0.4 | 2.0 | 0.3 |
| 6.00–7.99 | 12.0 | 3.8 | 0.1 | 2.1 | 0.2 | 1.7 | 0.2 |
| 8.00 or more | 10.6 | 3.6 | 0.1 | 1.8 | 0.1 | 1.5 | 0.1 |
| **1992** | | | | | | | |
| Total | 17.3 | 4.2 | 0.5 | 3.4 | 1.0 | 2.9 | 0.9 |
| 0.00–1.99 | 20.2 | 4.3 | 1.0 | 3.8 | 1.6 | 3.4 | 1.4 |
| 2.00–3.99 | 18.2 | 4.3 | 0.5 | 3.6 | 1.2 | 3.0 | 1.0 |
| 4.00–5.99 | 16.1 | 4.2 | 0.3 | 3.2 | 0.8 | 2.7 | 0.6 |
| 6.00–7.99 | 14.3 | 4.0 | 0.1 | 2.9 | 0.5 | 2.3 | 0.4 |
| 8.00 or more | 12.9 | 3.9 | 0.1 | 2.6 | 0.3 | 2.1 | 0.2 |

SOURCE: National Center for Education Statistics, High School and Beyond, and National Education Longitudinal Study of 1988.

[11]The small amount of variation in English course taking, and the declining levels of variation in math and science course taking, may be related to academic graduation requirements. As the number of credits required approaches the number of years students are in high school, the amount of possible variation can be expected to fall.

*Summary*

This section showed that levels of vocational participation, whether measured by the intensity of vocational course taking or the rate of vocational concentration, declined between 1982 and 1992. The intensity of occupationally specific course taking did not decline to the same extent as either of these other measures, although it too declined. Furthermore, levels of participation declined for virtually all student groups on all three measures, although some groups, like graduates with disabilities, continued to participate in the vocational curriculum at the same level in 1992 as in 1982.

Course taking in the academic curriculum overall and in the various subject areas increased between 1982 and 1992, regardless of the number of vocational credits completed. Still, the overall relationship between academic and vocational course taking did not change much between 1982 and 1992—course taking in these curricula was inversely related—even though the relationships did change over time in the various subject areas. Disparities in math and science course taking between graduates at either end of the vocational credit distribution declined over time, and differences in English remained small. However, disparities between these groups in advanced course taking in English, math, and science either increased or remained large throughout the 1982-92 period.

# Chapter 4

# Conclusions

The trends in course taking between 1982 and 1992 were broadly consistent with the goals of education reform outlined in *A Nation at Risk*. Students completed more academic course work, and more advanced academic course work, in 1992 than in 1982. At the same time, course taking in the vocational curriculum declined substantially between 1982 and 1992.

Many of the goals outlined in the Carl D. Perkins Vocational Education and Applied Technology Act do not appear to have been substantially advanced between 1982 and 1992, although most of this period preceded the effective date of the Act. For example, Congress has promoted increased participation by students in vocational programs that are nontraditional for their gender; nontraditional enrollments did not increase between 1982 and 1992, although gender disparities fell somewhat due to large declines in the rates of program participation by the predominant gender group in certain fields. Likewise, participation in high technology programs does not appear to have increased over the 10-year period.

To the extent that one can measure access to vocational programs with course taking data, Congress' goal of ensuring that vocational education programs are accessible to students with disabilities appears to have been met. Disabled students consistently took more vocational course work than nondisabled students, and the disparity between these groups actually increased over time. However, nothing conclusive can be said about the quality of the programs to which disabled students have access from the course taking data presented here.

Downward trends in patterns of vocational concentration, coupled with shifts in occupationally specific course taking away from sequential courses and towards specialty courses not clearly linked to a sequential program, suggest that participation in vocational education at the secondary level is increasingly diffuse. Whether high school graduates are not pursuing sequential courses for lack of time (due to increased academic requirements), changes in course offerings, or changes in their perceptions of the educational requirements for various occupations cannot be determined from these data, but the shift itself was consistent across all student groups.

# Appendix A

# Standard Error Tables

Table A1—Standard errors for table 2.1 and figures 2.1 and 2.2: Average number of credits earned by public high school graduates in the academic, vocational, and personal use curricula and in the vocational subcurricula: 1982–1992

| Year of graduation | Average credits earned in | | | | Vocational credits earned in | | | Occupationally specific credits by sequence | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | Academic | Vocational | Personal use | General labor market preparation | Consumer and homemaking education | Occupationally specific education | First course | Second course or higher | Specialty |
| 1982 | 0.064 | 0.069 | 0.056 | 0.036 | 0.020 | 0.016 | 0.048 | 0.034 | 0.024 | 0.011 |
| 1987 | 0.086 | 0.105 | 0.070 | 0.066 | 0.023 | 0.019 | 0.055 | 0.038 | 0.025 | 0.011 |
| 1990 | 0.121 | 0.122 | 0.077 | 0.078 | 0.028 | 0.029 | 0.066 | 0.055 | 0.034 | 0.019 |
| 1992 | 0.086 | 0.089 | 0.058 | 0.035 | 0.020 | 0.018 | 0.046 | 0.030 | 0.025 | 0.015 |

SOURCE: National Center for Education Statistics, High School and Beyond, 1987 High School Transcript Study, 1990 High School Transcript Study, and National Education Longitudinal Study of 1988.

Table A2—Standard errors for tables 2.2 and 2.3: Percentage of public high school graduates with credits in the academic, vocational, and personal use curricula and in the vocational subcurricula: 1982–1992

| Year of graduation | Percentage of graduates with credits in | | | Percentage of graduates with vocational credits in | | | Percentage of graduates with vocational credits in occupationally specific education | | |
|---|---|---|---|---|---|---|---|---|---|
| | Academic | Vocational | Personal use | General labor market preparation | Consumer and homemaking education | Occupationally specific education | First course | Second course or higher | Specialty |
| 1982 | 0.000 | 0.205 | 0.310 | 0.698 | 0.917 | 0.526 | 0.612 | 0.852 | 0.830 |
| 1987 | 0.000 | 0.351 | 0.621 | 1.042 | 1.221 | 0.606 | 0.847 | 0.915 | 1.045 |
| 1990 | 0.000 | 0.295 | 0.248 | 1.811 | 1.955 | 0.928 | 1.096 | 1.360 | 1.650 |
| 1992 | 0.000 | 0.262 | 0.093 | 1.253 | 1.182 | 0.559 | 0.879 | 0.964 | 1.190 |

SOURCE: National Center for Education Statistics, High School and Beyond, 1987 High School Transcript Study, 1990 High School Transcript Study, and National Education Longitudinal Study of 1988

**Table A3—Standard errors for table 2.4: Average number of credits earned by public high school graduates in the academic, vocational and personal use curricula and in the vocational subcurricula, by selected student characteristics: 1982 and 1992**

| Year of graduation and student characteristics | Average credits earned in | | | | Vocational credits earned in | | | Occupationally specific credits by sequence | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | Academic | Vocational | Personal use | General labor market preparation | Consumer and homemaking education | Occupationally specific education | First course | Second course or higher | Specialty |
| **1982** | | | | | | | | | | |
| Total | 0.064 | 0.069 | 0.056 | 0.036 | 0.020 | 0.016 | 0.048 | 0.034 | 0.024 | 0.011 |
| Gender | | | | | | | | | | |
| Male | 0.07[illegible] | 0.079 | 0.068 | 0.043 | 0.026 | 0.014 | 0.067 | 0.046 | 0.036 | 0.015 |
| Female | 0.07[illegible] | 0.083 | 0.066 | 0.047 | 0.022 | 0.025 | 0.057 | 0.035 | 0.028 | 0.013 |
| Race/ethnicity | | | | | | | | | | |
| American Indian | 0.294 | 0.254 | 0.264 | 0.124 | 0.120 | 0.072 | 0.240 | 0.213 | 0.127 | 0.071 |
| Asian | 0.173 | 0.251 | 0.183 | 0.118 | 0.073 | 0.031 | 0.147 | 0.103 | 0.065 | 0.030 |
| Black, non-Hispanic | 0.154 | 0.188 | 0.142 | 0.084 | 0.049 | 0.048 | 0.142 | 0.089 | 0.070 | 0.031 |
| Hispanic | 0.112 | 0.106 | 0.103 | 0.068 | 0.044 | 0.043 | 0.097 | 0.074 | 0.057 | 0.018 |
| White, non-Hispanic | 0.071 | 0.080 | 0.063 | 0.040 | 0.021 | 0.019 | 0.054 | 0.037 | 0.027 | 0.013 |
| Parents' educational attainment | | | | | | | | | | |
| Less than high school graduate | 0.122 | 0.128 | 0.108 | 0.083 | 0.051 | 0.049 | 0.103 | 0.070 | 0.060 | 0.035 |
| High school graduate | 0.096 | 0.093 | 0.082 | 0.050 | 0.031 | 0.028 | 0.077 | 0.051 | 0.043 | 0.019 |
| Some postsecondary | 0.082 | 0.097 | 0.077 | 0.047 | 0.029 | 0.024 | 0.066 | 0.049 | 0.035 | 0.014 |
| Bachelor's degree | 0.104 | 0.141 | 0.093 | 0.066 | 0.031 | 0.027 | 0.078 | 0.050 | 0.042 | 0.018 |
| Advanced degree | 0.116 | 0.162 | 0.106 | 0.067 | 0.041 | 0.029 | 0.084 | 0.059 | 0.045 | 0.017 |

Table A3—Standard errors for table 2.4: Average number of credits earned by public high school graduates in the academic, vocational and personal use curricula and in the vocational subcurricula, by selected student characteristics: 1982 and 1992—Continued

| Year of graduation and student characteristics | Average credits earned in | | | | Vocational credits earned in | | | Occupationally specific credits by sequence | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | Academic | Vocational | Personal use | General labor market preparation | Consumer and homemaking education | Occupationally specific education | First course | Second course or higher | Specialty |
| **1992** | | | | | | | | | | |
| Total | 0.086 | 0.089 | 0.058 | 0.035 | 0.020 | 0.018 | 0.046 | 0.030 | 0.025 | 0.015 |
| Gender | | | | | | | | | | |
| Male | 0.097 | 0.112 | 0.073 | 0.045 | 0.026 | 0.024 | 0.066 | 0.040 | 0.037 | 0.018 |
| Female | 0.096 | 0.099 | 0.073 | 0.038 | 0.020 | 0.023 | 0.057 | 0.038 | 0.030 | 0.019 |
| Race-ethnicity | | | | | | | | | | |
| American Indian | 0.333 | 0.333 | 0.348 | 0.219 | 0.089 | 0.077 | 0.351 | 0.229 | 0.219 | 0.064 |
| Asian | 0.209 | 0.280 | 0.218 | 0.078 | 0.048 | 0.036 | 0.205 | 0.133 | 0.084 | 0.044 |
| Black, non-Hispanic | 0.252 | 0.321 | 0.110 | 0.103 | 0.052 | 0.056 | 0.095 | 0.082 | 0.049 | 0.039 |
| Hispanic | 0.124 | 0.159 | 0.129 | 0.072 | 0.045 | 0.033 | 0.113 | 0.059 | 0.080 | 0.057 |
| White, non-Hispanic | 0.090 | 0.099 | 0.069 | 0.039 | 0.022 | 0.021 | 0.054 | 0.035 | 0.030 | 0.016 |
| Parents' educational attainment | | | | | | | | | | |
| Less than high school graduate | 0.161 | 0.174 | 0.125 | 0.071 | 0.049 | 0.047 | 0.107 | 0.069 | 0.065 | 0.070 |
| High school graduate | 0.155 | 0.195 | 0.119 | 0.049 | 0.031 | 0.041 | 0.099 | 0.060 | 0.061 | 0.030 |
| Some postsecondary | 0.107 | 0.117 | 0.080 | 0.054 | 0.025 | 0.025 | 0.064 | 0.046 | 0.032 | 0.020 |
| Bachelor's degree | 0.137 | 0.133 | 0.078 | 0.056 | 0.025 | 0.052 | 0.078 | 0.048 | 0.046 | 0.025 |
| Advanced degree | 0.138 | 0.144 | 0.078 | 0.082 | 0.031 | 0.025 | 0.061 | 0.041 | 0.028 | 0.027 |

SOURCE: National Center for Education Statistics, High School and Beyond, and National Education Longitudinal Study of 1988.

**Table A4—Standard errors for table 2.5: Average number of credits earned by public high school graduates in the academic, vocational, and personal use curricula and in the vocational subcurricula, by disability status: 1987 and 1992**

| Year of graduation and disability status | Average credits earned in | | | | Vocational credits earned in | | | Occupationally specific credits by sequence | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Total | Academic | Vocational | Personal use | General labor market preparation | Consumer and homemaking education | Occupationally specific education | First course | Second course or higher | Specialty |
| **1987** | | | | | | | | | | |
| Total | 0.064 | 0.069 | 0.056 | 0.036 | 0.020 | 0.016 | 0.048 | 0.034 | 0.024 | 0.011 |
| Has disability | 0.139 | 0.131 | 0.133 | 0.115 | 0.080 | 0.041 | 0.139 | 0.084 | 0.089 | 0.030 |
| No disability | 0.088 | 0.106 | 0.071 | 0.067 | 0.023 | 0.020 | 0.054 | 0.038 | 0.025 | 0.012 |
| **1992** | | | | | | | | | | |
| Total | 0.086 | 0.089 | 0.058 | 0.035 | 0.020 | 0.018 | 0.046 | 0.030 | 0.025 | 0.015 |
| Has disability | 0.182 | 0.276 | 0.240 | 0.144 | 0.085 | 0.104 | 0.215 | 0.174 | 0.125 | 0.062 |
| No disability | 0.087 | 0.090 | 0.058 | 0.035 | 0.020 | 0.018 | 0.046 | 0.030 | 0.025 | 0.015 |

SOURCE: National Center for Education Statistics, 1987 High School Transcript Study, and National Education Longitudinal Study of 1988.

**Table A5—Standard errors for table 2.6: Average number of credits earned by public high school graduates in the academic, vocational, and personal use curricula and in the vocational subcurricula, by limited-English-proficiency (LEP) status: 1992**

| LEP status | Average credits earned in | | | | Vocational credits earned in | | |
|---|---|---|---|---|---|---|---|
| | Total | Academic | Vocational | Personal use | General labor market preparation | Consumer and homemaking education | Occupationally specific education |
| Total | 0.086 | 0.089 | 0.058 | 0.035 | 0.020 | 0.018 | 0.046 |
| LEP | 0.234 | 0.268 | 0.283 | 0.123 | 0.097 | 0.074 | 0.235 |
| Non-LEP | 0.092 | 0.093 | 0.059 | 0.036 | 0.019 | 0.019 | 0.047 |

SOURCE: National Center for Education Statistics, National Education Longitudinal Study of 1988.

**Table A6—Data for figure 3.1: Percentage distribution of public high school graduates according to the number of credits earned in vocational education: 1982–1992**

| Year of graduation | 0.00–0.99 | 1.00–1.99 | 2.00–2.99 | 3.00–3.99 | 4.00–4.99 | 5.00–5.99 | 6.00–6.99 | 7.00–7.99 | 8.00 or more |
|---|---|---|---|---|---|---|---|---|---|
| 1982 | 6.0 | 11.4 | 12.5 | 12.5 | 12.6 | 12.0 | 9.8 | 8.5 | 14.7 |
| 1987 | 5.8 | 12.3 | 14.4 | 13.0 | 12.8 | 11.4 | 9.1 | 8.0 | 13.2 |
| 1990 | 7.5 | 15.5 | 15.6 | 13.6 | 11.7 | 9.4 | 8.4 | 6.7 | 11.5 |
| 1992 | 9.3 | 16.8 | 16.0 | 14.4 | 12.5 | 10.0 | 7.2 | 5.2 | 8.6 |

NOTE: Percentages may not sum to 100 percent due to rounding

SOURCE: National Center for Education Statistics, High School and Beyond, 1987 High School Transcript Study, 1990 High School Transcript Study, and National Education Longitudinal Study of 1988

**Table A7—Standard errors for figure 3.1: Percentage distribution of public high school graduates according to the number of credits earned in vocational education: 1982–1992**

| Year of graduation | 0.00–0.99 | 1.00–1.99 | 2.00–2.99 | 3.00–3.99 | 4.00–4.99 | 5.00–5.99 | 6.00–6.99 | 7.00–7.99 | 8.00 or more |
|---|---|---|---|---|---|---|---|---|---|
| 1982 | 0.365 | 0.503 | 0.477 | 0.444 | 0.499 | 0.485 | 0.439 | 0.376 | 0.625 |
| 1987 | 0.572 | 0.487 | 0.459 | 0.422 | 0.424 | 0.404 | 0.324 | 0.398 | 0.599 |
| 1990 | 0.703 | 0.598 | 0.488 | 0.465 | 0.395 | 0.386 | 0.386 | 0.303 | 0.713 |
| 1992 | 0.639 | 0.762 | 0.764 | 0.623 | 0.577 | 0.495 | 0.358 | 0.344 | 0.479 |

SOURCE: National Center for Education Statistics, High School and Beyond, 1987 High School Transcript Study, 1990 High School Transcript Study, and National Education Longitudinal Study of 1988

**Table A8—Standard errors for table 3.1: Percentage distribution of public high school graduates according to the number of credits earned in vocational education, by gender, race-ethnicity, and parents' educational attainment: 1982 and 1992**

| Year of graduation and student characteristics | 0.00–0.99 | 1.00–1.99 | 2.00–2.99 | 3.00–3.99 | 4.00–4.99 | 5.00–5.99 | 6.00–6.99 | 7.00–7.99 | 8.00 or more |
|---|---|---|---|---|---|---|---|---|---|
| **1982** | | | | | | | | | |
| Total | 0.365 | 0.503 | 0.477 | 0.444 | 0.499 | 0.485 | 0.439 | 0.376 | 0.625 |
| Gender | | | | | | | | | |
| Male | 0.493 | 0.620 | 0.630 | 0.631 | 0.728 | 0.700 | 0.580 | 0.571 | 0.811 |
| Female | 0.453 | 0.671 | 0.667 | 0.671 | 0.648 | 0.658 | 0.572 | 0.463 | 0.778 |
| Race–ethnicity | | | | | | | | | |
| American Indian | 1.310 | 2.152 | 3.226 | 2.684 | 2.970 | 6.569 | 9.701 | 3.155 | 3.063 |
| Asian | 2.022 | 2.776 | 3.174 | 2.062 | 2.263 | 3.223 | 1.706 | 1.209 | 1.689 |
| Black, non-Hispanic | 0.336 | 1.418 | 1.223 | 1.155 | 1.365 | 1.379 | 1.288 | 0.948 | 1.868 |
| Hispanic | 0.422 | 0.789 | 1.018 | 1.026 | 1.159 | 0.988 | 1.096 | 1.137 | 1.486 |
| White, non-Hispanic | 0.477 | 0.594 | 0.586 | 0.552 | 0.603 | 0.572 | 0.500 | 0.447 | 0.693 |
| Parents' educational attainment | | | | | | | | | |
| Less than high school graduate | 0.407 | 1.089 | 0.841 | 1.356 | 2.020 | 1.384 | 1.374 | 1.090 | 1.569 |
| High school graduate | 0.439 | 0.633 | 0.715 | 0.733 | 0.814 | 0.796 | 0.722 | 0.744 | 1.096 |
| Some postsecondary | 0.590 | 0.779 | 0.879 | 0.880 | 0.906 | 0.963 | 0.717 | 0.641 | 0.939 |
| Bachelor's degree | 1.292 | 1.738 | 1.458 | 1.299 | 1.365 | 1.161 | 0.908 | 0.706 | 0.758 |
| Advanced degree | 1.542 | 1.767 | 1.618 | 1.299 | 1.116 | 1.332 | 0.863 | 0.654 | 0.857 |
| **1992** | | | | | | | | | |
| Total | 0.639 | 0.762 | 0.764 | 0.623 | 0.577 | 0.495 | 0.358 | 0.344 | 0.479 |
| Gender | | | | | | | | | |
| Male | 0.581 | 1.043 | 1.297 | 1.084 | 0.835 | 0.765 | 0.455 | 0.543 | 0.642 |
| Female | 1.080 | 1.028 | 0.850 | 0.643 | 0.738 | 0.572 | 0.534 | 0.365 | 0.627 |
| Race–ethnicity | | | | | | | | | |
| American Indian | 2.148 | 1.980 | 3.772 | 4.541 | 3.812 | 2.985 | 2.386 | 3.437 | 4.250 |
| Asian | 1.567 | 2.369 | 1.746 | 1.607 | 2.266 | 1.731 | 1.469 | 0.824 | 3.221 |
| Black, non-Hispanic | 1.015 | 1.441 | 2.598 | 2.186 | 2.204 | 1.747 | 1.202 | 0.996 | 0.952 |
| Hispanic | 1.072 | 2.719 | 1.483 | 1.489 | 1.749 | 1.495 | 1.499 | 1.814 | 0.934 |
| White, non-Hispanic | 0.823 | 0.896 | 0.924 | 0.755 | 0.622 | 0.542 | 0.394 | 0.350 | 0.574 |
| Parents' educational attainment | | | | | | | | | |
| Less than high school graduate | 0.951 | 1.355 | 1.832 | 1.520 | 2.564 | 1.478 | 1.149 | 1.125 | 1.496 |
| High school graduate | 0.524 | 1.195 | 2.769 | 1.578 | 1.216 | 1.429 | 0.961 | 0.912 | 1.110 |
| Some postsecondary | 1.363 | 0.933 | 0.996 | 0.940 | 1.004 | 0.656 | 0.507 | 0.525 | 0.734 |
| Bachelor's degree | 1.280 | 1.609 | 1.810 | 2.542 | 1.294 | 0.745 | 0.570 | 0.469 | 0.508 |
| Advanced degree | 1.865 | 2.800 | 1.563 | 1.410 | 1.173 | 0.688 | 0.387 | 0.506 | 0.305 |

SOURCE: National Center for Education Statistics, High School and Beyond, and National Education Longitudinal Study of 1988.

**Table A9—Standard errors for table 3.2: Percentage distribution of public high school graduates according to the number of credits earned in vocational education, by disability status: 1987 and 1992**

| Year of graduation and disability status | 0.00–0.99 | 1.00–1.99 | 2.00–2.99 | 3.00–3.99 | 4.00–4.99 | 5.00–5.99 | 6.00–6.99 | 7.00–7.99 | 8.00 or more |
|---|---|---|---|---|---|---|---|---|---|
| **1987** | | | | | | | | | |
| Total | 0.572 | 0.487 | 0.459 | 0.422 | 0.424 | 0.404 | 0.324 | 0.398 | 0.599 |
| Has disability | 0.263 | 1.160 | 0.530 | 0.668 | 0.816 | 0.891 | 1.239 | 0.971 | 1.725 |
| No disability | 0.595 | 0.498 | 0.467 | 0.429 | 0.433 | 0.413 | 0.337 | 0.405 | 0.598 |
| **1992** | | | | | | | | | |
| Total | 0.639 | 0.762 | 0.764 | 0.623 | 0.577 | 0.495 | 0.358 | 0.344 | 0.479 |
| Has disability | 1.117 | 1.618 | 2.570 | 2.171 | 2.107 | 1.856 | 2.334 | 2.698 | 3.266 |
| No disability | 0.658 | 0.785 | 0.785 | 0.643 | 0.589 | 0.505 | 0.364 | 0.336 | 0.476 |

SOURCE: National Center for Education Statistics, 1987 High School Transcript Study, and National Education Longitudinal Study of 1988.

**Table A10—Data for figure 3.2: Percentage distribution of public high school graduates according to the number of credits earned in occupationally specific courses: 1982–1992**

| Year of graduation | 0.00 | 0.01–0.99 | 1.00–1.99 | 2.00–2.99 | 3.00–3.99 | 4.00 or more |
|---|---|---|---|---|---|---|
| 1982 | 13.5 | 7.3 | 18.5 | 16.3 | 13.3 | 31.2 |
| 1987 | 11.5 | 7.6 | 20.2 | 16.1 | 13.2 | 31.5 |
| 1990 | 13.3 | 8.9 | 22.1 | 15.6 | 12.2 | 28.0 |
| 1992 | 12.9 | 10.3 | 22.2 | 17.3 | 12.2 | 25.0 |

NOTE: Percentages may not sum to 100 percent due to rounding.

SOURCE: National Center for Education Statistics, High School and Beyond, 1987 High School Transcript Study, 1990 High School Transcript Study, and National Education Longitudinal Study of 1988.

**Table A11—Standard errors for figure 3.2: Percentage distribution of public high school graduates according to the number of credits earned in occupationally specific courses: 1982–1992**

| Year of graduation | 0.00 | 0.01–0.99 | 1.00–1.99 | 2.00–2.99 | 3.00–3.99 | 4.00 or more |
|---|---|---|---|---|---|---|
| 1982 | 0.526 | 0.407 | 0.534 | 0.540 | 0.479 | 0.800 |
| 1987 | 0.606 | 0.560 | 0.529 | 0.422 | 0.441 | 0.954 |
| 1990 | 0.928 | 0.540 | 0.558 | 0.441 | 0.472 | 1.015 |
| 1992 | 0.559 | 0.803 | 0.824 | 0.701 | 0.485 | 0.824 |

SOURCE: National Center for Education Statistics, High School and Beyond, 1987 High School Transcript Study, 1990 High School Transcript Study, and National Education Longitudinal Study of 1988.

Table A12—Standard errors for table 3.3: Percentage distribution of public high school graduates according to the number of credits earned in occupationally specific courses, by gender, race–ethnicity, and parents' educational attainment: 1982 and 1992

| Year of graduation and student characteristics | 0.00 | 0.01–0.99 | 1.00–1.99 | 2.00–2.99 | 3.00–3.99 | 4.00 or more |
|---|---|---|---|---|---|---|
| **1982** | | | | | | |
| Total | 0.526 | 0.407 | 0.534 | 0.540 | 0.479 | 0.800 |
| Gender | | | | | | |
| Male | 0.618 | 0.510 | 0.740 | 0.747 | 0.689 | 1.156 |
| Female | 0.749 | 0.592 | 0.757 | 0.765 | 0.656 | 0.912 |
| Race–ethnicity | | | | | | |
| American Indian | 2.225 | 1.497 | 3.771 | 2.701 | 3.692 | 8.050 |
| Asian | 3.360 | 1.929 | 2.393 | 2.527 | 3.312 | 3.106 |
| Black, non-Hispanic | 1.285 | 0.972 | 1.519 | 1.412 | 1.312 | 2.202 |
| Hispanic | 1.007 | 0.761 | 1.231 | 1.178 | 1.188 | 1.697 |
| White, non-Hispanic | 0.625 | 0.484 | 0.642 | 0.665 | 0.570 | 0.928 |
| Parents' educational attainment | | | | | | |
| Less than high school graduate | 0.907 | 0.668 | 1.462 | 1.781 | 1.503 | 2.004 |
| High school graduate | 0.683 | 0.609 | 0.896 | 0.875 | 0.798 | 1.301 |
| Some postsecondary | 0.891 | 0.647 | 0.987 | 0.994 | 0.904 | 1.238 |
| Bachelor's degree | 1.624 | 1.483 | 1.525 | 1.333 | 1.405 | 1.378 |
| Advanced degree | 1.848 | 1.097 | 1.783 | 1.500 | 1.183 | 1.425 |
| **1992** | | | | | | |
| Total | 0.559 | 0.803 | 0.824 | 0.701 | 0.485 | 0.824 |
| Gender | | | | | | |
| Male | 0.661 | 0.974 | 1.326 | 1.157 | 0.748 | 1.242 |
| Female | 0.811 | 1.214 | 1.051 | 0.784 | 0.615 | 0.971 |
| Race–ethnicity | | | | | | |
| American Indian | 2.625 | 1.886 | 4.136 | 3.737 | 4.148 | 5.351 |
| Asian | 1.631 | 1.307 | 2.602 | 1.560 | 2.453 | 3.468 |
| Black, non-Hispanic | 1.367 | 1.815 | 2.002 | 2.907 | 1.220 | 2.141 |
| Hispanic | 1.271 | 2.343 | 2.042 | 1.571 | 1.367 | 2.952 |
| White, non-Hispanic | 0.684 | 0.978 | 1.037 | 0.785 | 0.585 | 0.910 |
| Parents' educational attainment | | | | | | |
| Less than high school graduate | 1.141 | 0.887 | 2.064 | 1.560 | 1.800 | 2.578 |
| High school graduate | 0.851 | 0.813 | 2.725 | 1.763 | 1.295 | 1.840 |
| Some postsecondary | 0.804 | 1.347 | 1.154 | 1.198 | 0.775 | 1.176 |
| Bachelor's degree | 1.538 | 2.549 | 1.520 | 1.945 | 1.235 | 1.280 |
| Advanced degree | 2.020 | 1.362 | 2.786 | 1.692 | 0.940 | 1.042 |

SOURCE. National Center for Education Statistics, High School and Beyond, and National Education Longitudinal Study of 1988.

**Table A13—Standard errors for table 3.4: Percentage distribution of public high school graduates according to the number of credits earned in occupationally specific courses, by disability status: 1987 and 1992**

| Year of graduation and disability status | 0.00 | 0.01–0.99 | 1.00–1.99 | 2.00–2.99 | 3.00–3.99 | 4.00 or more |
|---|---|---|---|---|---|---|
| **1987** | | | | | | |
| Total | 0.526 | 0.407 | 0.534 | 0.540 | 0.479 | 0.800 |
| Has disability | 1.582 | 0.606 | 1.442 | 0.940 | 0.726 | 2.162 |
| No disability | 0.616 | 0.577 | 0.534 | 0.432 | 0.455 | 0.951 |
| **1992** | | | | | | |
| Total | 0.559 | 0.803 | 0.824 | 0.701 | 0.485 | 0.824 |
| Has disability | 1.633 | 1.537 | 2.854 | 2.392 | 2.256 | 3.724 |
| No disability | 0.571 | 0.825 | 0.846 | 0.717 | 0.495 | 0.822 |

SOURCE: National Center for Education Statistics, 1987 High School Transcript Study, and National Education Longitudinal Study of 1988.

**Table A14—Standard errors for table 3.5: Percentage of public high school graduates concentrating (earning 3.0 or more credits) in each occupationally specific field: 1982–1992**

| Year of graduation | Total vocational concentrators | Vocational concentration by field | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Agriculture | Business | Marketing | Health | Occupational home economics | Trade and industry | Technical/ communi-cations |
| 1982 | 0.825 | 0.298 | 0.460 | 0.209 | 0.106 | 0.232 | 0.597 | 0.089 |
| 1987 | 0.932 | 0.279 | 0.543 | 0.268 | 0.124 | 0.233 | 0.560 | 0.123 |
| 1990 | 1.060 | 0.375 | 0.641 | 0.331 | 0.102 | 0.256 | 0.668 | 0.084 |
| 1992 | 0.778 | 0.280 | 0.431 | 0.205 | 0.097 | 0.276 | 0.487 | 0.108 |

SOURCE: National Center for Education Statistics, High School and Beyond, 1987 High School Transcript Study, 1990 High School Transcript Study, and National Education Longitudinal Study of 1988.

Table A15—Standard errors for table 3.6: Percentage of public high school graduates concentrating (earning 3.0 or more credits) in each occupationally specific field, by gender, race-ethnicity, and parents' educational attainment: 1982 and 1992

| Year of graduation and student characteristics | Total vocational concentrators | Vocational concentration by field | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Agriculture | Business | Marketing | Health | Occupational home economics | Trade and industry | Technical/ communi-cations |
| **1982** | | | | | | | | |
| Total | 0.825 | 0.298 | 0.460 | 0.209 | 0.106 | 0.232 | 0.597 | 0.089 |
| Gender | | | | | | | | |
| Male | 1.170 | 0.562 | 0.296 | 0.259 | 0.064 | 0.218 | 1.111 | 0.153 |
| Female | 0.992 | 0.165 | 0.812 | 0.311 | 0.197 | 0.399 | 0.237 | 0.082 |
| Race-ethnicity | | | | | | | | |
| American Indian | 7.637 | 1.061 | 2.268 | 0.739 | 0.602 | 0.939 | 9.292 | 0.000 |
| Asian | 2.758 | 0.368 | 1.421 | 0.411 | 0.000 | 0.252 | 2.127 | 1.139 |
| Black, non-Hispanic | 2.228 | 0.352 | 1.341 | 0.708 | 0.420 | 0.542 | 1.546 | 0.141 |
| Hispanic | 1.762 | 0.603 | 1.003 | 0.411 | 0.556 | 0.409 | 1.416 | 0.088 |
| White, non-Hispanic | 0.953 | 0.363 | 0.553 | 0.237 | 0.087 | 0.299 | 0.659 | 0.107 |
| Parents' educational attainment | | | | | | | | |
| Less than high school graduate | 2.068 | 0.593 | 1.385 | 0.615 | 0.583 | 1.137 | 1.494 | 0.358 |
| High school graduate | 1.263 | 0.467 | 0.808 | 0.393 | 0.165 | 0.353 | 1.065 | 0.152 |
| Some postsecondary | 1.239 | 0.518 | 0.850 | 0.268 | 0.147 | 0.462 | 0.912 | 0.136 |
| Bachelor's degree | 1.533 | 0.548 | 0.894 | 0.378 | 0.211 | 0.372 | 1.068 | 0.087 |
| Advanced degree | 1.518 | 0.363 | 0.870 | 0.679 | 0.171 | 0.223 | 0.997 | 0.266 |
| **1992** | | | | | | | | |
| Total | 0.778 | 0.280 | 0.431 | 0.205 | 0.097 | 0.276 | 0.487 | 0.108 |
| Gender | | | | | | | | |
| Male | 1.164 | 0.508 | 0.438 | 0.261 | 0.040 | 0.244 | 0.909 | 0.180 |
| Female | 0.960 | 0.158 | 0.704 | 0.299 | 0.163 | 0.424 | 0.406 | 0.102 |
| Race-ethnicity | | | | | | | | |
| American Indian | 5.350 | 2.214 | 1.261 | 0.941 | 0.479 | 2.459 | 4.715 | 0.000 |
| Asian | 3.745 | 0.270 | 2.576 | 0.300 | 0.863 | 0.066 | 3.255 | 0.080 |
| Black, non-Hispanic | 2.088 | 0.382 | 1.043 | 0.544 | 0.219 | 1.319 | 0.956 | 0.268 |
| Hispanic | 2.050 | 0.252 | 1.445 | 0.267 | 0.258 | 0.983 | 1.415 | 0.361 |
| White, non-Hispanic | 0.917 | 0.343 | 0.508 | 0.263 | 0.087 | 0.276 | 0.566 | 0.133 |
| Parents' educational attainment | | | | | | | | |
| Less than high school graduate | 2.314 | 0.688 | 1.489 | 0.543 | 0.613 | 0.727 | 1.360 | 0.235 |
| High school graduate | 1.880 | 0.576 | 1.004 | 0.609 | 0.200 | 0.505 | 1.290 | 0.364 |
| Some postsecondary | 1.101 | 0.392 | 0.660 | 0.265 | 0.104 | 0.367 | 0.718 | 0.133 |
| Bachelor's degree | 1.251 | 0.318 | 0.632 | 0.302 | 0.154 | 0.255 | 0.837 | 0.230 |
| Advanced degree | 0.981 | 0.206 | 0.639 | 0.252 | 0.094 | 0.235 | 0.507 | 0.266 |

NOTE: Zeros in the table indicate that no students concentrated in the particular field designated.

SOURCE: National Center for Education Statistics, High School and Beyond, and National Education Longitudinal Study of 1988

**Table A16—Standard errors for table 3.7: Percentage of public high school graduates concentrating (earning 3.0 or more credits) in each occupationally specific field, by disability status: 1987 and 1992**

| Year of graduation and disability status | Total vocational concentration | Vocational concentration by field | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Agriculture | Business | Marketing | Health | Occupational home economics | Trade and industry | Technical/ communi-cations |
| 1987 | | | | | | | | |
| Total | 0.932 | 0.279 | 0.543 | 0.268 | 0.124 | 0.233 | 0.560 | 0.123 |
| Has disability | 2.075 | 0.932 | 0.580 | 0.708 | 0.377 | 0.878 | 1.314 | 0.256 |
| No disability | 0.937 | 0.276 | 0.558 | 0.268 | 0.125 | 0.232 | 0.562 | 0.125 |
| 1992 | | | | | | | | |
| Total | 0.778 | 0.280 | 0.431 | 0.205 | 0.097 | 0.276 | 0.487 | 0.108 |
| Has disability | 3.740 | 2.476 | 1.678 | 0.351 | 0.272 | 2.344 | 3.435 | |
| No disability | 0.775 | 0.257 | 0.443 | 0.212 | 0.100 | 0.274 | 0.477 | 0.112 |

*Estimate less than .05 percent.

SOURCE: National Center for Education Statistics, 1987 High School Transcript Study, and National Education Longitudinal Study of 1988.

**Table A17—Standard errors for table 3.8: Average number of credits earned by public high school graduates in selected academic fields, by number of credits earned in vocational education: 1982 and 1992**

| Year of graduation and number of vocational credits | Total academic | All English | Advanced English | All math | Advanced math | All science | Advanced science |
|---|---|---|---|---|---|---|---|
| 1982 | | | | | | | |
| Total | 0.069 | 0.019 | 0.015 | 0.019 | 0.015 | 0.021 | 0.013 |
| 0.00–1.99 | 0.105 | 0.037 | 0.038 | 0.030 | 0.041 | 0.044 | 0.034 |
| 2.00–3.99 | 0.089 | 0.026 | 0.023 | 0.029 | 0.025 | 0.035 | 0.024 |
| 4.00–5.99 | 0.082 | 0.028 | 0.021 | 0.029 | 0.020 | 0.031 | 0.018 |
| 6.00–7.99 | 0.083 | 0.033 | 0.016 | 0.032 | 0.015 | 0.030 | 0.015 |
| 8.00 or more | 0.102 | 0.041 | 0.015 | 0.040 | 0.016 | 0.032 | 0.016 |
| 1992 | | | | | | | |
| Total | 0.089 | 0.018 | 0.025 | 0.021 | 0.021 | 0.027 | 0.019 |
| 0.00–1.99 | 0.097 | 0.024 | 0.056 | 0.026 | 0.035 | 0.035 | 0.029 |
| 2.00–3.99 | 0.124 | 0.030 | 0.043 | 0.029 | 0.036 | 0.046 | 0.034 |
| 4.00–5.99 | 0.128 | 0.036 | 0.029 | 0.038 | 0.032 | 0.037 | 0.027 |
| 6.00–7.99 | 0.102 | 0.034 | 0.019 | 0.034 | 0.027 | 0.036 | 0.023 |
| 8.00 or more | 0.138 | 0.041 | 0.022 | 0.043 | 0.033 | 0.046 | 0.031 |

SOURCE: National Center for Education Statistics, High School and Beyond, and National Education Longitudinal Study of 1988

# Appendix B

# Glossary

## Appendix B
## Glossary

**Academic subjects**: The high school academic curriculum is divided into the main subject areas listed below. These courses are not exhaustive of the courses included in each subject area.

**Mathematics**: Includes courses in basic math, general math, applied math, algebra, geometry, and advanced math. Advanced math includes algebra 2, trigonometry, analytic geometry, precalculus, probability and statistics, and calculus.

**Science**: Includes courses in biology, chemistry, and physics, as well as survey courses and those in other areas. Advanced science includes chemistry, physics, and advanced biology.

**English**: Includes survey and skills courses, as well as courses in literature, composition and writing, and speech. Advanced English includes honors and advanced placement courses, including honors courses taken prior to the senior year.

**Social studies**: Includes courses in American history, world history, American government and politics, social sciences, such as economics and anthropology, and humanities, such as philosophy.

**Fine arts**: Includes courses that fulfill a general art requirement, as well as performing arts and advanced courses. Media courses include arts and crafts, music, drama, and dance.

**Foreign languages**: Includes all courses that teach second languages, including English as a second language, as well as classes in languages other than English.

**Carnegie unit**: A standard of measurement used for secondary education that represents the completion of a course that meets approximately 1 hour per day for 1 year. See credit.

**Courses completed**: Students were said to have completed a course in a subject area if they earned a Carnegie unit, or a fraction of a unit, in that subject area.

**Credit**: For simplicity's sake, the publication refers to a Carnegie unit as a credit. See Carnegie unit.

**Curriculum types**: At its most aggregated level, the Secondary School Taxonomy divides the high school curriculum into three distinct curricula:

**Academic**: See academic subjects.

**Vocational**: See vocational education

**Personal use/other**: Included in this curriculum are courses intended for personal development, such as courses in general skills, health and physical education, religion and theology, driver training, and military science.

**Disability status**: Students were classified as having a disability if their transcript indicated that the student had an Individual Educational Program (IEP), or was enrolled in a special program for students with disabilities.

**Limited-English-proficiency status**: A student was defined as limited English proficient if they were so designated by a teacher or parent on the NELS survey.

**Minority status**: Persons were classified as belonging to a minority group, if they were black, non-Hispanic; Hispanic; Asian; or Native American. See race-ethnicity.

**Parents' educational attainment**: The highest level of educational attainment by either parent. Five levels of attainment are reported here:

**Less than high school graduate**: Neither parent completed high school.

**High school graduate**: One or both parents earned a high school diploma or General Equivalency Diploma (GED), but neither parent attended a postsecondary institution.

**Some postsecondary education**: One or both parents attended a college or other postsecondary institution without completing a bachelor's degree. One or both parents may have completed an associate's degree or some type of vocational certificate or award.

**Bachelor's degree**: One or both parents earned a bachelor's degree, but neither parent completed any kind of advanced degree.

**Advanced degree**: One or both parents completed a master's degree, first professional degree (such as a medical or law degree), or a doctorate.

**Race-ethnicity**: Classification indicating general racial or ethnic heritage based on self-identification. These categories are in accordance with the classification scheme presented below:

**White, non-Hispanic**: A person having origins in any of the peoples of Europe, North Africa, or the Middle East, excluding persons of Hispanic origin.

**Black, non-Hispanic**: A person having origins in any of the black racial groups in Africa, excluding persons of Hispanic origin.

**Hispanic**: A person of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin, regardless of race.

**Asian**: A person having origins in any of the peoples of the Far East, Southeast Asia, the Indian subcontinent, or the Pacific Islands including, for example, China, India, Japan, Korea, the Philippine Islands, and Samoa.

**American Indian**: A person having origins in any of the peoples of North America, including Alaskan natives, and maintaining cultural identification through tribal affiliation or community recognition.

**Special populations**: The federal regulations pertaining to the Carl D. Perkins Vocational and Applied Technology Education Act of 1990 define special populations as individuals with disabilities, educationally and economically disadvantaged individuals, individuals of limited English proficiency, individuals who participate in programs designed to eliminate sex bias, and individuals in correctional institutions.

**Specialty courses**: Nonsequential courses in a vocational program area.

**Vocational education**: Organized educational programs, services, and activities that are directly related to the preparation of individuals for paid or unpaid employment or for additional preparation for a career, requiring other than a bachelor's or an advanced degree. This publication refers to the following types of vocational education at the high school level:

**Consumer and homemaking education**: Consists of courses intended to prepare students for roles outside the paid labor market. Topics covered include child care, meal preparation, nutrition, and household management.

**General labor market preparation**: Consists of courses that teach general employment skills, but do not have as their primary objective preparing students for paid employment in a specific field. These courses include introductory typewriting, industrial arts, career education, agricultural math and business English, among others.

**Occupationally specific education**: Consists of courses that teach skills and provide information required in a particular vocation. Courses are organized into first level, second or higher level, and specialty courses.

**Vocational program areas**:

**Agriculture**: Includes courses that prepare students for employment in farming, horticulture, fishing, or forestry. In addition, courses in natural resources teach skills in conservation, wildlife, forestry, logging, and paper production.

**Business**: Offers training in business support and business management, including data processing, accounting, shorthand, stenography, advanced typewriting, and recordkeeping, as well as finance, investments, personnel, and other aspects of management. Also included are courses in library science and security services.

**Marketing**: Includes courses related to the selling and distribution of goods and services, teaching skills ranging from cash register operation to marketing and management research (once called distributive education).

**Health**: Includes courses intended to prepare students for careers in the health professions, such as those that train students to become nurses and dental assistants, lab technicians, and ambulance operators.

**Occupational home economics**: Includes courses intended to prepare students for employment in the service sector, such as child care, food preparation, cleaning services, plant maintenance, and protection services. Unlike consumer and homemaking education, occupational home economics emphasizes skills and training for the paid labor force.

**Trade and industry**: Includes coursework in construction, mechanics and repairs, precision production, and transportation. Construction includes courses in carpentry, plumbing, electrical wiring, and welding. Mechanics and repairs includes courses in repairing a variety of consumer goods. Precision production includes courses that teach students how to design and manufacture goods, such as woodworking, graphic design, printing, sheet metal, drafting and computer aided design, and architecture.

**Technical and communications**: Includes courses related to skills used in television and radio, as well as computer courses, such as programming.

# Appendix C

# Technical Notes

## Appendix C
## Technical Notes

### Sources of Data

Four transcript data sets were used for this study: High School and Beyond (HS&B, 1982 graduates), the National Assessment of Educational Progress 1987 High School Transcript Study (NAEP:87), the National Assessment of Educational Progress 1990 High School Transcript Study (NAEP:90), and the National Educational Longitudinal Study of 1988 (NELS, 1992 graduates). All of these data sets were sponsored and are maintained by the National Center for Education Statistics in the U.S. Department of Education. These data sets are well suited for this study, although the sample frames for these data sources were different enough that special steps were required to ensure sample comparability.

#### *Sample Comparability*

The primary means for ensuring comparability of the student samples across data sets was to restrict the sample to public high school graduates. While the content of the high school diploma varies from state to state, or even from one district to another within states, the diploma establishes a more or less common level of attainment among students and over time. Additionally, the sample of graduates included from each data set was limited to students for whom complete transcripts were available. A complete transcript was defined as one that recorded between 16 and 32 Carnegie units, with a positive, non-zero number of credits completed in English.

The High School and Beyond (HS&B) base-year survey was administered in the spring of 1980 to approximately 30,000 high school sophomores and 28,000 high school seniors in more than 1,000 high schools nationwide. Followup surveys were conducted in 1982, 1984, 1986, and 1992. The data presented in this report included items from the base year and first three followup surveys, but the sample of students was defined by membership in the 1982 HS&B Sophomore Transcript file. The transcript file contains 15,940 cases, and the realized sample for this study included 9,510 public high school graduates. Of those students who were excluded from the sample, 961 had transcripts that were out of range, 2,484 were dropouts or were still working for their diploma, and 2,985 were enrolled in private high schools. Public high school students were defined by HSTYPE=1, and a "student type" variable was developed to identify high school graduates in the HS&B transcript file. This variable is a composite of graduation status variables obtained from the First Followup survey (FUSTTYPE), the Transcript survey (RESNLEFT), and the Second Followup survey (SY12). Students were classified as graduates sequentially based on their classifications by these three variables. In cases where the three variables agreed with respect to the student's graduation status, the student was classified accordingly. Where there was disagreement among these variables, preference was given to second followup data (SY12) because of its later date of collection and greater specificity. If this variable was missing, preference was then given to transcript survey data (RESNLEFT); only when the student's graduation status

was ambiguous or missing from both of these surveys was the first followup variable (FUSTTYPE) used to classify the case.

The two NAEP transcript surveys are quite different from the HS&B. The HS&B data set is longitudinal, while the NAEP:87 and NAEP:90 data sets are cross-sectional. The NAEP data sets include nationally representative samples of high school seniors in 1987 and 1990, and like the HS&B, the student samples included in this study were defined by the availability of high school transcripts. In the 1987 file, high school transcripts were available for 34,140 students who were enrolled in approximately 300 schools; of these students, 24,426 were public high school graduates. Another 6,698 were identified as non-completers or special education diploma recipients, 969 had transcripts that were out of range, and the remainder were enrolled at private schools. Public high school students were defined by STYPE=1, and the variable "student exit status" (EXSTAT) was used to distinguish between graduates and nongraduates. Students classified as "regular" (code 1) or "honors" (code 2) graduates, and students whose exit status was classified as "other" (code 7) were eligible for inclusion in the sample of graduates. Students in the "other" category were included so that transfers and others (such as late graduates) not explicitly identified as such would not be excluded from the sample. Students who were explicitly described as recipients of special education diplomas were excluded from the sample because they had no counterparts in the other data sets.

The 1990 NAEP transcript data file included high school transcripts from 21,531 students from about 330 schools. Public high school students were identified by STYPE=1, and the realized sample of public high school graduates included 16,456 students. Of the students who were excluded from the analysis file, 4,732 were enrolled in private schools, and 343 had transcripts that were out of range or who were identified as not having a regular or honors diploma. As with the 1987 data file, the "student exit status" (EXSTAT) variable was used to identify high school graduates. However, this version of the EXSTAT variable had a simpler structure than the 1987 version. Students identified in 1990 as having earned a standard diploma (code 1) or honors diploma (code 2) were included. All others were excluded from the sample.

Like HS&B, the NELS data set is longitudinal. The base-year survey was administered to about 24,000 eighth graders in more than 1,000 schools with an eighth grade class. Students were followed up two years later when most were in the tenth grade, and again two years after that when most were high school seniors. With each new followup, and unlike HS&B, the student sample was "freshened" (students not eligible in the base year were added to the sample) so a representative sample of the grade cohort could be obtained. Although this sampling strategy can pose significant problems if it is not carefully controlled in longitudinal analyses, the sample used here was defined by the transcript sample, which is representative of all 12th graders in 1992. Transcripts were available for about 17,285 students, but almost 2,000 of these students were identified as dropouts at the time of the second followup survey in 1992, and about 2,300 were enrolled in private schools. The sample of public high school graduates used in this study included 11,707 students. After restricting the sample to those students in public schools (G12CTRL2=1), the "reason left" (F2REASL) variable was used to identify graduates. Students identified as having earned a standard or honors diploma (codes 1 or 2) were included in the sample; all others were excluded.

*Transcript Weights*

Because the transcript samples in each of these data sets comprise a unique group of students, separate transcript-specific weights are required to produce accurate estimates of the characteristics and course taking behavior of the population. The weights used for this study were TRWT for HS&B, FINSTUWT for NAEP:87, FINSTUWT for NAEP:90, and F2TRSCWT for NELS.

*Student Characteristics*

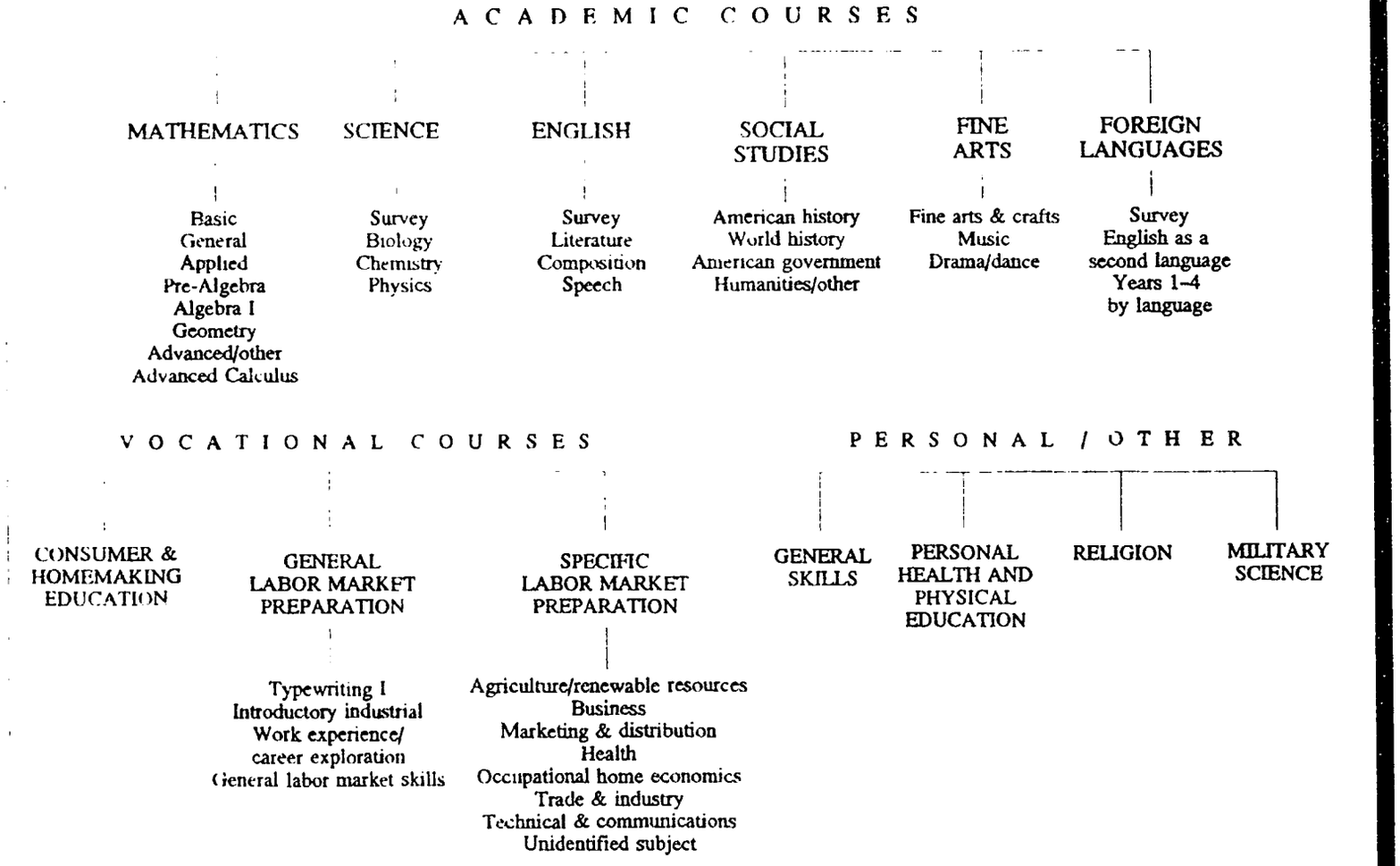
Not all of the student characteristics reported here are available in all of the data sets. Gender and race-ethnicity are available in all four data sets, and the definitions of these variables are comparable across data sets. Disability status is also available in all four data sources, but because of significant differences in the definition of the disabled student samples between HS&B and the other sources, the 1982 disability status data cannot be reported with data for the other trend points. However, the definition of disabled students is relatively comparable in the NAEP:87, NAEP:90, and NELS transcript files, so it is possible to trace course taking among students with and without disabilities between 1987 and 1992. The parents' education data are only available in HS&B and NELS, so trends over time can only be charted by the end points of the time series. Finally, LEP status is only available in the NELS data set, so no trend analysis is possible in relation to this characteristic.

## Course Classification

The courses contained in each transcript data set were categorized in the Secondary School Taxonomy (SST) to ensure comparability over time (figure C.1). This taxonomy organizes transcript data into three different curricula: academic, vocational, and personal use/other.[12] The academic curriculum is divided into six subject areas: mathematics, science, English, social studies, fine arts, and foreign languages. Courses within each subject area are then organized within topical concentrations, and where possible within the topical concentrations by level or degree of difficulty (basic, regular, advanced placement/honors, or specialized topics).

[12]The original SST was developed for the 1986 National Assessment of Vocational Education (NAVE) by Cynthia L. Brown, E. Gareth Hoachlander, and Robert H. Meyer, with the assistance of National Assessment staff, staff of the NAVE Support Center, and an external review panel. The original version of the SST included a fourth curriculum, special education, but because of the relatively small number of students completing these credits and the uncertain coverage of special education courses in several of the transcript data sets, subsequent versions of the SST did not include a separate special education curriculum.

Figure C.1—Organization of the Secondary School Taxonomy




SOURCE: A.G. Gifford, E.G. Hoachlander, J.E. Tuma, *The Secondary School Taxonomy*, a report prepared for the National Assessment of Vocational Education, Office of Planning, Budget, and Evaluation, U.S. Department of Education (Berkeley: MPR Associates, Inc., February 1989).

The vocational curriculum includes three basic subdivisions: consumer and homemaking education (C&HE), general labor market preparation (GLMP), and specific labor market preparation (SLMP). (In this report, SLMP is referred to as Occupationally Specific Education). C&HE courses provide training and teach skills for activities outside of the paid labor force such as homemaking, food preparation and nutrition, sewing, and parenting. Courses that are designed to impart widely applicable vocational skills, such as typewriting, business math, or business English, or that provide a broad overview of vocational alternatives, such as introduction to industrial arts or career exploration, are included in the GLMP curriculum. Occupationally specific courses are incorporated into the SLMP curriculum, which are in turn organized by vocational field: agriculture, business, marketing, health, occupational home economics, trade and industry, and technical and communications. Within the SLMP fields, courses are designated as the first course in a sequence, second or higher course in a sequence, or as specialty courses. Any courses that could be clearly differentiated by their level are included in the specific sequence categories; the specialty courses category primarily includes courses that do not fit into a sequence or courses.

Rates of participation and trends in the average number of credits completed by graduates tend to move in concert, so this report focuses on the average credit estimates. Including data on the rates of participation enriches the discussion, but the gain in accuracy is small and the cost in terms of complexity is large. Therefore, only where the participation and credit data do not match were both types of data presented. The presentation was further simplified by focusing on only the end points of the time series (1982 and 1992). The trends in course taking throughout the curriculum are virtually linear between these two points in time, and adding the middle data points (1987 and 1990) adds to the complexity of the presentation without adding much new information. However, where trends in course taking over time were not linear between the end points, or in instances where the discussion is greatly enriched by doing so, the middle data points have been added to the relevant tables.

## Accuracy of Estimates

The estimates in this report are derived from samples and are subject to two broad classes of error—sampling and nonsampling error. Sampling errors occur because the data are collected from a sample of a population rather than from the entire population. Estimates based on a sample will differ somewhat from the values that would have been obtained from a universe survey using the same instruments, instructions, and procedures. Nonsampling errors come from a variety of sources and affect universe surveys as well as sample surveys. Examples of sources of nonsampling error include design, reporting, and processing errors and errors due to nonresponse. The effects of nonsampling errors are more difficult to evaluate than those that result from sampling variability. As much as possible, procedures are built into surveys in order to minimize nonsampling errors.

The standard error is a measure of the variability due to sampling when estimating a parameter. It indicates how much variance there is in the population of possible estimates of a parameter for a given sample size. Standard errors can be used as a measure of the precision expected from a particular sample. The probability that a complete census would

differ from the sample by less than the standard error is about 68 out of 100. The chances that the difference would be less than 1.65 times the standard error are about 90 out of 100; that the difference would be less than 1.96 times the standard error, about 95 out of 100.

## Methodology and Statistical Procedures

The comparisons in the text have all been tested for statistical significance to ensure that the differences are larger than those that might be expected due to sampling variation. Three types of comparisons have been made in the text.

*Differences in two percentages.* The Student's *t* statistic was used to test the likelihood that the differences between two independent percentages were larger than would be expected due to sampling error. The Student's *t* values can be computed for comparisons using the estimates in these tables with the following formula:

$$t = \frac{P_1 - P_2}{\sqrt{se_1^2 + se_2^2}}$$

where $P_1$ and $P_2$ are the percentages to be compared and $se_1$ and $se_2$ are their corresponding standard errors. This formula is only valid for independent estimates. When estimates are not independent (for example, when comparing the percentages within a percent distribution—in this report, within a row in a table), a covariance term was added to the denominator of the *t*-test formula.

There are hazards in reporting statistical tests for each comparison. First, large *t*-values may appear to merit special attention. However, the magnitude of the *t*-statistic is related not only to the observed differences in means or percentages, but also to the number of students in the categories that are being compared. A small difference compared across a large number of students will produce a large *t*-statistic.

Second, as the number of comparisons on the same set of data increases, the likelihood that the *t* value for at least one of the comparisons will exceed 1.96 simply due to sampling error increases. For a single comparison, there is a 5 percent chance that the *t* value will exceed 1.96 due to sampling error. For five tests, the risk of getting at least one *t* value that high increases to 23 percent, and for 20 comparisons, it increases to 64 percent. One way to compensate for this danger when making multiple comparisons is to adjust the critical value that the *t*-statistic must equal or exceed to take into account the number of comparisons being made. This is done using a Bonferroni adjustment to control for the number of possible comparisons—the family of comparisons—between the categories of the variable being tested. Family size, *k*, is calculated as follows: $k = [j * (j - 1)]/2$, where j is equal to the number of categories in the variable. In a 5-category variable such as parent's education, *k* would be equal to [(5)(5-1)]/2, or 10. The family size is then used to adjust the probability that one would incorrectly conclude that two estimates were different because of sampling error. Differences between two estimates were only reported when $p \leq 0.05/k$, or

in the case of parents' education, when $p \leq 0.005$ (that is, 0.05/10). In order to conclude that two estimates were different in this case, the critical value that the *t*-statistic had to equal or exceed was 2.81, which was obtained from a table of *t* statistics for a two-tailed test.

*Trends.* In several instances, pair-wise comparisons proved too cumbersome. For example, one would like to say something about the general relationship between the number of vocational credits completed by high school graduates and their parents' level of educational attainment. In many cases, not all of the ten possible comparisons are statistically significant, even though the data appear to suggest clear trends. In such cases, a weighted least squares regression formula was used to test whether the upward trend between parents' educational attainment and the number of vocational credits completed was significant, even if all of the pair-wise comparisons were not.

This regression test for linearity was done in this analysis using the data manipulation and regression capabilities of the Microsoft EXCEL spreadsheet program. The input data for the regressions were the estimates and standard errors in the standard output tables generated by the STRATTAB program, a proprietary table program developed by MPR Associates, Inc. All of the variables included in the regression equations were transformed by dividing them by the standard error of the relevant proportion. An intercept variable was also created by dividing a column of 1s by the standard error of the corresponding proportion. The new dependent variable was then regressed on the new independent variable and the intercept variable. The statistical significance of beta for the independent variable was then evaluated in relation to $p \leq 0.05$, or $t \leq 1.96$. One important limitation of this test is that it can only be used to assess trends across ordered variables or variable categories.

*Differences in distributions.* The third type of test used in this report is the chi-square test, which was used to assess whether one distribution was different from another. For example, one would like to evaluate the relationship between race-ethnicity and distribution of students by the number of vocational credits completed. With five race-ethnicity categories and nine vocational credit categories, there are 90 possible pair-wise comparisons when the comparisons are restricted to differences between race-ethnicity groups within each credit category. In this instance, the chi-square test enables one to evaluate whether the distribution of students by the number of vocational credits completed varied by race-ethnicity using a single test.

Once the chi-square value is calculated, it is adjusted by the cell-specific design effects (DEFT)—rather than the average DEFT for the whole sample—to take into account the complex sample design. These effects were estimated using a Microsoft EXCEL spreadsheet model, which is based on work by Rao and Thomas.[13] In general, this adjustment reduces the value of the chi-square (because complex samples are not as efficient as simple random samples of equivalent size). This value is then evaluated in relation to a critical value that is obtained from a table for a test with n degrees of freedom and a specified significance level. In this case, the significance level was set a $p \leq 0.05$. The degrees of freedom were calculated as number of row categories minus 1 times number of column categories minus 1.

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[13] J.N.K. Rao and D.R Thomas, "Chi-Squared Tests for Contingency Tables," in Skinner, Holt, and Smith, *Analysis of Complex Surveys* (New York: Wiley and Sons, 1989), chapter 4.

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