National Center for Education Statistics

DATA ON VOCATIONAL EDUCATION

Trends in High School Vocational/Technical Coursetaking: 1982–1998

Statistical Analysis Report

U.S. Department of Education
Institute of Education Sciences
NCES 2003–025

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Statistical Analysis Report

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NCES 2003–025

June 2003

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Executive Summary

Vocational/technical education is a common component of public high school education in the United States. Among 1998 public high school graduates, 96.5 percent earned at least some credits in vocational/technical education in high school. In addition, the number of credits earned in vocational/technical education by 1998 graduates was not significantly different on average from the number of credits they earned in English and in social studies, and they earned more credits in vocational/technical education than they did in mathematics, science, fine arts, or foreign languages.

Purpose of the Report

This report examines vocational/technical coursetaking among public high school graduates between 1982 and 1998. The report focuses on trends in vocational/technical coursetaking overall, in introductory technology and computer-related coursetaking, and in the ways in which high school students combine vocational/technical and academic coursetaking. The report analyzes these trends by examining high school transcripts for the graduating classes of 1982, 1990, 1992, 1994, and 1998.[1] Transcripts provide information on the courses that graduates took in grades 9 through 12. For simplicity's sake, the report refers to this information as "high school coursetaking." With the exception of the section on vocational/technical coursetaking by grade level, which examines coursetaking in each of grades 9 through 12 separately, the report describes the cumulative coursework that graduates took in high school. The report uses the National Center for Education Statistics (NCES) Secondary School Taxonomy (SST) to classify courses into broad course groupings. As figure A shows, the SST classifies high school courses into three main areas (academic, vocational/technical, and enrichment/other) and their curricular subareas.

The Vocational/Technical Curriculum

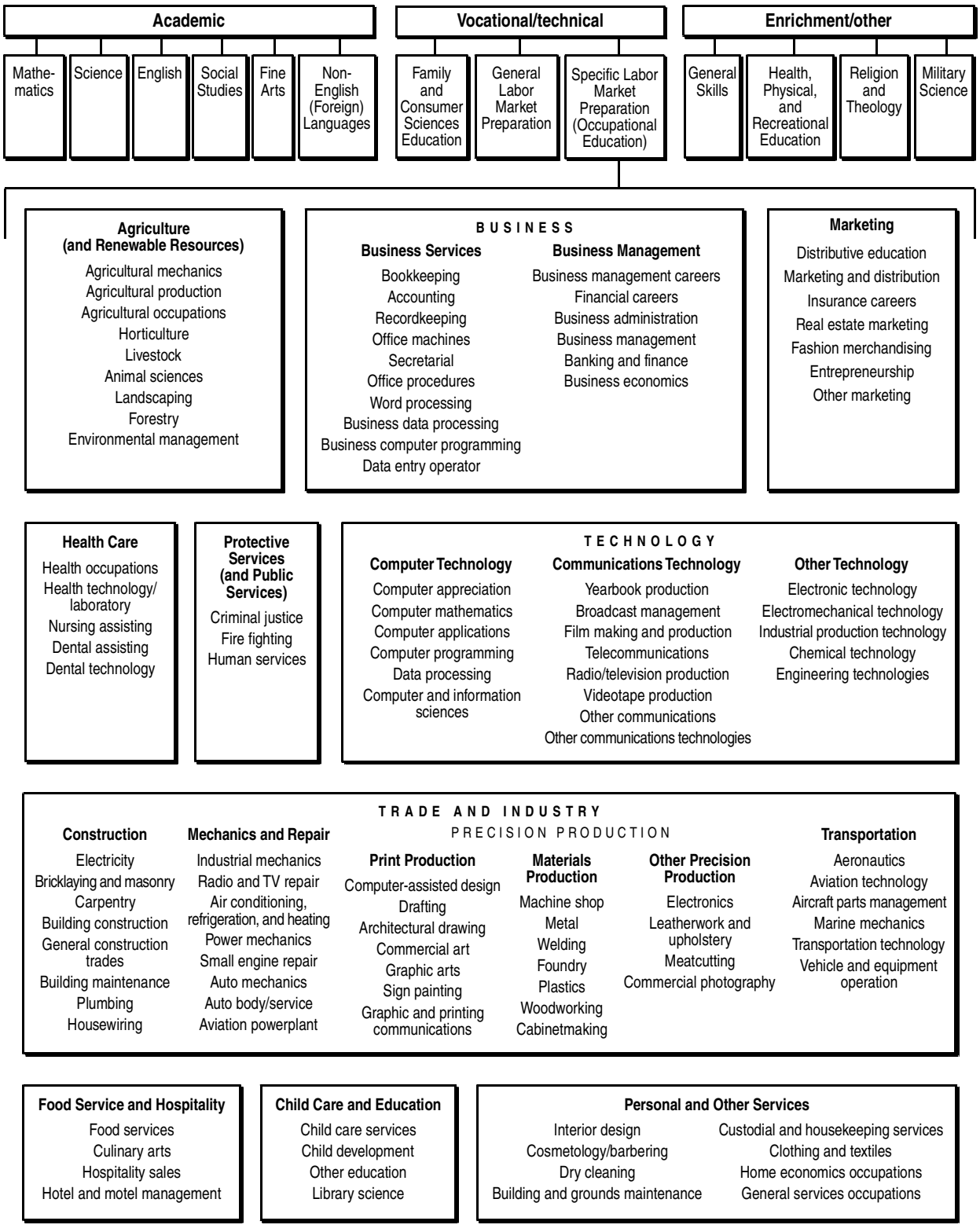
High school vocational/technical education encompasses three subcurricula: specific labor market preparation or "occupational education," general labor market preparation, and family and consumer sciences education (figure A). Occupational education consists of courses that teach skills and knowledge required in a particular occupation or set of related occupations. Based on SST classifications, occupational education in this report consists of the 10 broad and 18 narrow program areas shown in figure A.

General labor market preparation consists of courses that teach general employment skills that are not specific to one occupational area, such as basic typewriting/keyboarding, introductory technology education, and career preparation and general work experience courses. Family and consumer sciences education consists of courses intended to prepare students for family and consumer roles outside of the paid labor market.[2]

[1]These transcript studies were conducted as part of the High School and Beyond (HS&B) Sophomore Cohort Study (1982 graduates), the National Education Longitudinal Study of 1988 (NELS, 1992 graduates), and the High School Transcript Study (HSTS) of 1990, 1994, and 1998 (1990, 1994, and 1998 graduates, respectively).

[2]Home economics-related courses that prepare students for the paid labor market are included under occupational education, in the child care and education, food service and hospitality, and personal and other services program areas.

Figure A. Secondary school taxonomy



SOURCE: Adapted from Bradby, D. and Hoachlander, E.G. (1999). *1998 Revision of the Secondary School Taxonomy* (NCES 1999–06). U.S. Department of Education. Washington, DC: National Center for Education Statistics Working Paper.

As of 1998, 90.7 percent of public high school graduates had earned credits in occupational education in high school, 58.8 percent in general labor market preparation, and 44.4 percent in family and consumer sciences education.

Key Measures of Participation

Seven measures were used to define participation in vocational/technical education:

- *Vocational/technical coursetakers:* Graduates earning more than 0.0 credits in vocational/technical education in high school. All of the following groups of students are subsets of this group.

- *Occupational coursetakers:* Graduates earning more than 0.0 credits in occupational education in high school. This measure is a subset of the previous measure.

- *Vocational/technical investors:* Graduates earning 3.0 or more credits in vocational/technical education in high school. All of the following groups of students are subsets of this group.

- *Occupational investors:* Graduates earning 3.0 or more credits in occupational education in high school, regardless of whether they concentrate their occupational coursetaking in a single program area. This measure is a subset of the previous measure.

- *Occupational concentrators:* Graduates earning 3.0 or more credits in high school in one of the 10 broad occupational program areas in figure A.[3] This measure is a subset of the previous measure. The report also provides information on graduates concentrating (earning 3.0 or more credits) in one of the 18 narrow occupational program areas in figure A.

- *Advanced occupational concentrators:* Graduates earning 3.0 or more credits in high school in one of the 10 broad occupational program areas in figure A, with at least 1.0 advanced credit in that program area. Advanced occupational coursework includes second- or higher-level courses and cooperative education courses.[4] This measure is a subset of the previous measure.

- *Advanced occupational concentrators with cooperative education:* Graduates earning 3.0 or more credits in high school in one of the 10 broad occupational program areas in figure A, with at least 1.0 cooperative education credit in that program area.[5] This measure is a subset of the previous measure.

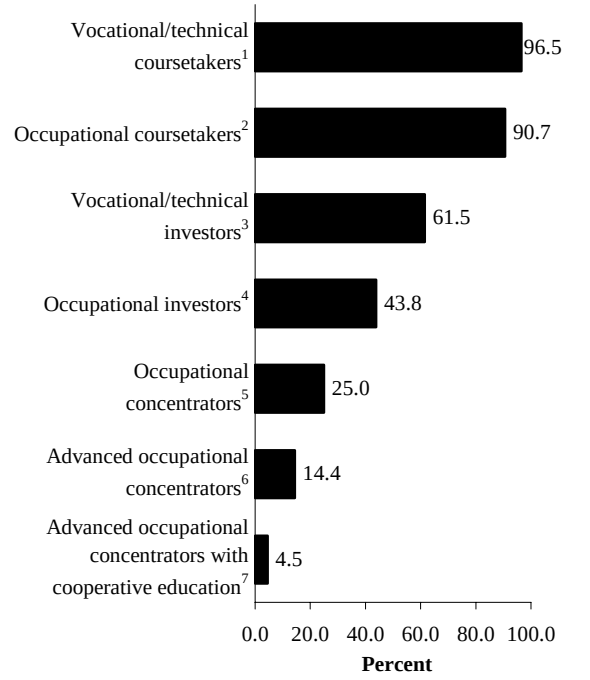
Figure B shows the percentage of 1998 public high school graduates who fell within each participation measure. According to the least restrictive measure—the percentage of public high school graduates who were vocational/technical coursetakers—almost all 1998 graduates (96.5 percent) participated in the vocational/technical curriculum in high school. According to the most restrictive measure—the percentage of graduates who were advanced occupational concentrators with cooperative education—just 4.5 percent of 1998 graduates were counted as participating in vocational/technical education.

[3]In the small number of cases where graduates earned 3.0 or more credits in more than one occupational program area, they were assigned to the program area in which they earned the most credits.

[4]The SST divides the occupational courses in each program area into four categories: first-level, second- or higher-level, cooperative education, and specialty courses. The first three categories generally represent sequential coursetaking.

[5]Cooperative education awards school credit for work experience that is related to a student's occupational program and typically alternates work placements and classroom time.

Figure B. Percentage of public high school graduates meeting different measures of participation in vocational/technical education: 1998



[1]Graduates earning greater than 0.0 credits in vocational/technical education.

[2]Graduates earning greater than 0.0 credits in occupational education.

[3]Graduates earning 3.0 or more credits in vocational/technical education.

[4]Graduates earning 3.0 or more credits in occupational education, regardless of whether they concentrate their occupational coursetaking in a single program area.

[5]Graduates earning 3.0 or more credits in one of the following 10 broad occupational program areas: agriculture, business, marketing, health care, protective services, technology, trade and industry, food service and hospitality, child care and education, and personal and other services.

[6]Graduates earning 3.0 or more credits in one of the 10 broad occupational program areas, with at least 1.0 advanced credit in that program area. Advanced occupational coursework includes second- or higher-level courses and cooperative education courses.

[7]Graduates earning 3.0 or more credits in one of the 10 broad occupational program areas, with at least 1.0 cooperative education credit in that program area.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Transcript Study (HSTS), 1998.

Overall Trends in Vocational/ Technical Coursetaking

Between 1982 and 1998, the primary change in vocational/technical coursetaking was not in the proportion of high school students participating in vocational/technical education but in the amount of vocational/technical education they took. That is, the breadth of vocational/technical coursetaking declined slightly, while the depth of this coursetaking declined more steeply. However, most declines in vocational/technical coursetaking occurred by the early 1990s.

The average number of vocational/technical credits earned by graduates declined between 1982 and 1990, after which there were no statistically significant changes. However, during the 1990s, vocational/technical credits continued to represent a declining share of the total high school credits that graduates earned. This relative decline was due to the fact that public high school graduates earned on average more academic credits and—to a lesser extent—more enrichment/other credits over this decade.

Trends in the Three Vocational/Technical Subcurricula

The decrease since 1982 in average vocational/technical credits earned by graduates was due primarily to a decrease in general labor market preparation coursetaking. Furthermore, this decline was due primarily to a decrease between 1982 and 1998 in the number of basic typewriting/keyboarding courses that graduates took in high school. The number of credits that graduates earned in family and consumer sciences education also declined over this period.

In contrast, there were no statistically significant changes between 1982 and 1998 in the average number of credits that graduates earned in occupational education in high school (about 3 credits for each graduating class). There was also no significant change between 1982 and 1998 in the breadth of occupational coursetaking, with most public high school graduates earning at least some occupational credits during the period studied.

Vocational/Technical Coursetaking by Grade Level

For the high school graduating class of 1998, the majority of vocational/technical coursetaking (about 60 percent) occurred in the 11th and 12th grades, while about 40 percent occurred in the 9th and 10th grades. Specifically, 1998 graduates earned 1.51 credits on average—the equivalent of about one and a half full-year courses—in the 12th grade. In contrast, 1998 graduates earned 1.01 credits in the 11th grade, 0.75 credits in the 10th grade, and 0.71 credits in the 9th grade.

The timing of occupational and family and consumer sciences education coursetaking was similar to that of overall vocational/technical coursetaking, with more of this coursetaking occurring in grade 12 than in earlier grades. However, general labor market preparation coursetaking was more likely to occur in grade 9.

Trends in occupational coursetaking varied at the different grade levels over the period studied. The average number of occupational credits earned by public high school graduates in the 11th grade decreased between 1982 and 1998, whereas the average number earned in the 9th grade increased. There were no statistically significant changes in the average number of occupational credits earned in the 10th and 12th grades. The reduction in occupational coursetaking in the 11th grade may be related to graduates taking additional academic courses in that grade over the period studied, thereby having less time for occupational coursework.

Trends in Occupational Coursetaking by Program Area

The average number of occupational credits that 1998 graduates earned in high school was not statistically different from the average number earned by 1982 graduates. However, the percentage of public high school graduates who concentrated in occupational education—those who earned 3.0 or more credits in one of the 10 broad occupational program areas in figure A—declined from 33.7 percent in 1982 to 27.8 percent in 1990. No significant changes were detected after 1990, however, with about 25 percent of 1992, 1994, and 1998 graduates concentrating in occupational education. Trends in occupational coursetaking varied widely by program area, however. The following sections examine program area trends between 1982 and 1998 in the breadth of occupational coursetaking (that is, the percentage of graduates taking at least one course in a program area) and in the depth of occupational coursetaking (including both the average credits earned and the percentage of graduates concentrating in a program area).

Program Areas With Declining Coursetaking

Among the 18 narrow occupational program areas in figure A, the areas of materials production, business management, and mechanics and repair exhibited declines in both the breadth and depth of high school coursetaking over the period studied. For example, materials production exhibited declines between 1982 and 1998 in the percentage of public high school graduates who took

at least one course in the program area, in the average number of credits earned by public high school graduates in the program area, and in the percentage of graduates who concentrated (earned 3.0 or more credits) in the program area. Declines in materials production and in mechanics and repair coincided with projected changes in occupational employment in precision production, craft, and repair occupations (Hurst and Hudson 2000).

Paralleling the trends in vocational/technical education and in occupational education noted above, the business services program area exhibited less change in the breadth of coursetaking than in the depth of that coursetaking. There was no statistically significant difference in the percentage of 1982 and 1998 graduates who earned business services credits in high school. In contrast, 1998 graduates earned fewer credits on average in business services than did 1982 graduates, and fewer public high school graduates concentrated (earned 3.0 or more credits) in business services over that period.

Declines between 1982 and 1998 in business services coursetaking were due primarily to declines in average credits earned in non-computer-related business services courses (including bookkeeping, accounting, secretarial, and general office procedures courses). In contrast, average credits earned in computer-related business services courses increased over the same period. Overall declines in business services coursework coincided with projections of below-average growth for secretary and typist occupations (Hurst and Hudson 2000).

Program Areas With Increasing Coursetaking

Two of the 18 narrow occupational program areas in figure A—computer technology and communications technology—generally exhibited increases in both the breadth and depth of coursetaking over the period studied. In addition, both health care programs and child care and education programs exhibited some increase in the depth—but not the breadth—of coursetaking over the period studied. To some extent, these increases in occupational coursetaking reflect projected changes in employment for technicians and related support occupations, health service occupations, and child care workers and teacher aides (Hurst and Hudson 2000).

A Closer Look at Trends in Occupational Concentrating

Between 1982 and 1998, high school students were less likely to concentrate in occupational education. However, the decline in occupational concentrating was not due to changes in the percentage of 1982 and 1998 graduates who earned 3.0 or more occupational credits (who were occupational investors) in high school. Rather, the decline reflected a change in coursetaking among these occupational investors. The percentage of occupational investors who concentrated in occupational education in high school—who earned 3.0 or more credits in one of the 10 broad occupational program areas in figure A—declined from 72.8 percent in 1982 to 59.1 percent in 1992, after which no statistically significant changes were detected.

Additionally, the percentage of public high school graduates who completed an advanced occupational concentration in high school—occupational concentrators who earned at least 1.0 credit in advanced coursework in their program area—declined from 24.0 percent in 1982 to 16.1 percent in 1990, after which no statistically significant changes were detected. Part of this decline in advanced occupational concentrating among graduates was due to the fact that gradu-

ates were less likely to concentrate in occupational education in general over the period studied. However, the percentage of occupational concentrators who completed an advanced concentration in their program area also declined from 1982 to 1990, after which no statistically significant changes were detected.

In order to understand changes in coursetaking and concentrating in some detail, the report compared trends among the 18 narrow occupational program areas in figure A.

Shifts Away From Concentrated Occupational Coursetaking

What types of occupational courses did occupational investors (graduates who earned 3.0 or more occupational credits in high school) take instead of concentrating in an occupational program area? Some of the decline in the propensity of occupational investors to concentrate in occupational education was due to a shift from concentrating (earning 3.0 or more credits) in business services to taking more communications technology and computer technology courses. That is, occupational investors as a group took fewer business services courses over the period studied (specifically, fewer noncomputer-related business services courses)—enough to reduce their concentrating in this program area at a relatively high rate. At the same time, they took additional communications technology and computer technology courses—but not enough to increase their rates of concentrating on a par with their increased coursetaking in these program areas. Thus, the decline in occupational investors' propensity to concentrate in business services coincided with an increase in their total computer-related coursetaking within the occupational education curriculum.

Shifts Away From Completing an Advanced Occupational Concentration

What types of occupational courses did occupational concentrators take in high school instead of completing advanced coursework in their area of concentration? In part, occupational concentrators took fewer courses in general in their respective areas of concentration between 1982 and 1998. This decrease was due primarily to a decline in second- or higher-level coursetaking, rather than declines in first-level, cooperative education, or specialty courses. As a result of this change, occupational concentrators shifted the distribution of their occupational coursework toward specialty courses. (Typically, specialty courses either offer specialized occupational training or provide related skills that can be applied to a range of occupations and are not part of the usual sequence of courses in a program area.)

Work-Based Learning

About one-third of 1998 public high school graduates took at least some work-based learning courses—defined here as general work experience courses and cooperative education courses—in high school.[6] There were no significant differences in either the percentage of 1982 and 1998 graduates taking these courses or the average number of credits these graduates earned in work-based learning courses. Both 1982 and 1998 graduates earned on average about 0.5 credits in

[6]General work experience awards school credit for work that is *not* connected to a specific occupational program, while cooperative education awards school credit for work experience that *is* related to a student's occupational program. This analysis focuses on these types of work-based learning, because they are awarded school credit and recorded on transcripts. In addition, as of 1997, cooperative education was one of the two most common forms of work-based learning in high schools, along with job shadowing (Levesque et al. 2000).

work-based learning courses—equivalent to one half-year course.

Vocational/Technical Coursetaking and State High School Graduation Requirements

The report examined changes in participation in vocational/technical education among states that had different changes in high school graduation requirements. Because of limitations in the data, the analysis was restricted to changes between 1990 and 1998.[7] Although there were no significant differences between 1990 and 1998 in the percentage of graduates taking vocational/technical courses or in the average number of vocational/technical credits earned by graduates, coursetaking patterns varied somewhat with changes in state graduation requirements over this shortened period.

There was some evidence that, in states that increased their total graduation requirements or their total nonvocational/technical requirements, students decreased their vocational/technical coursetaking. For example, students in states that increased their total high school graduation requirements by 2.0 or more credits between 1990 and 1998 earned on average 1.0 fewer vocational/technical credits by the end of the period. Similarly, students in states that increased their total high school graduation requirements by 2.0 or more credits between 1990 and 1998 were less likely by the end of the period to invest (earn 3.0 or more credits) in vocational/technical education, to invest (earn 3.0 or more credits) in occupational education, or to concentrate (earn 3.0 or more credits) in one of the 10 broad occupational program areas in figure A. In contrast, students in states that increased their total high school graduation requirements by fewer than 2.0 credits, that did not increase these requirements, or that did not have applicable state requirements did not exhibit statistically significant decreases on any of these vocational/technical coursetaking measures.

[7]It was not possible to link student transcripts to states in the High School and Beyond data set, which provided information on 1982 high school graduates for this report, and data on state graduation requirements were not available for 1992 and 1994.

Trends in Computer-Related Coursetaking

The SST currently includes all computer-related courses (including those taught in mathematics and computer science departments) under the vocational/technical curriculum. Although some of these courses are classified as general labor market preparation (under basic typewriting/keyboarding and technology education), most computer-related courses are classified as occupational education. These latter courses are included under the business services, computer technology, and drafting/graphics areas.

Computer-Related Coursetaking in 1998

The 1998 public high school graduates earned on average 1.05 credits in computer-related courses in high school—equivalent to about one full-year computer-related course. Most of these credits were earned in the occupational curriculum, while the rest were earned in general labor market preparation. Within the occupational curriculum, 1998 public high school graduates earned more computer-related credits on average in the business services and the computer technology program areas than in computer-related drafting/graphics courses. Within the general labor market preparation curriculum, 1998 public high school graduates earned more credits in basic typewriting/keyboarding than in technology education.

Within the computer technology program area, 1998 graduates earned more high school credits on average in computer applications courses than in any other computer technology area (including computer science and systems, computer programming, data processing, and computer mathematics).

Trends in Computer-Related Coursetaking

Due to inconsistencies over time in whether basic typewriting/keyboarding courses were classified as computer related (Alt and Bradby 1999), trends in computer-related general labor market preparation courses and in overall computer-related coursetaking were examined from 1990 to 1998. There was no significant difference in the average number of overall computer-related credits earned by 1990 and 1998 graduates or in the average number of computer-related credits they earned within the occupational curriculum. However, comparing 1998 graduates with their 1990 counterparts, there was a decline in the average number of computer-related credits these graduates earned within the general labor market preparation curriculum. This decline was due primarily to graduates taking fewer basic typewriting/keyboarding courses in high school during the 1990s.

In contrast to trends in overall computer-related coursetaking and in computer-related general labor market preparation coursetaking, trends in computer-related occupational coursetaking cover the entire period from 1982 to 1998. Graduates earned on average 0.58 more computer-related occupational credits in high school in 1998 than in 1982, equivalent to more than one additional half-year course. Specifically, 1998 public high school graduates earned on average 0.32 more computer-related credits in business services, compared with 0.20 more credits in computer technology and 0.06 more computer-related credits in drafting/graphics than their 1982 counterparts.

Academic Coursetaking Trends

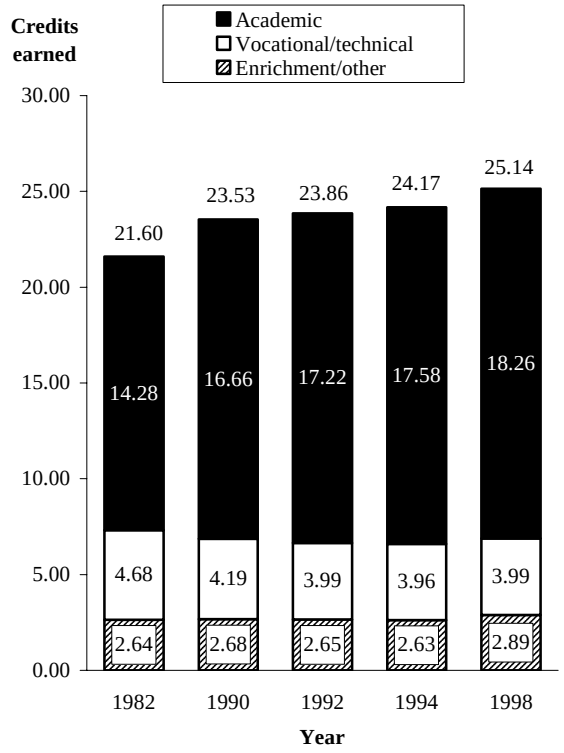
Between 1982 and 1998, public high school graduates increased both the number and rigor of the academic courses they took in high school. On average, 1998 graduates earned 3.98 more credits in academic courses—equivalent to about four full-year academic courses—and they earned more credits in each core academic subject (English, mathematics, science, and social studies) than their 1982 counterparts. The 1998 graduates were also more likely to take advanced coursework in English, mathematics, and science than the 1982 graduates.

Graduates on average decreased their vocational/technical coursetaking by a relatively small amount while taking additional academic coursework over the period studied. In general, students made room for additional academic courses primarily by increasing the total number of credits they earned in high school rather than by reducing their vocational/technical coursetaking. The 1998 public high school graduates earned 0.69 fewer vocational/technical credits on average than the 1982 graduates, while they earned 3.98 more academic credits and 0.25 more enrichment/other credits than their 1982 counterparts (figure C).

Trends in the Academic Coursetaking of Occupational Concentrators

Both occupational concentrators and nonconcentrators (the latter including all public high school graduates except occupational concentrators) increased the number and rigor of the academic courses they took between 1982 and 1998. In some instances, the rate of increase was greater

Figure C. Average number of credits earned by public high school graduates, by curriculum: Various years, 1982–98



NOTE: Detail may not sum to totals because of rounding. Years are not spaced proportionally.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982; National Education Longitudinal Study of 1988 (NELS:88), Second Follow-up Survey and High School Transcript Study, 1992; and High School Transcript Studies (HSTS), 1990, 1994, and 1998.

for occupational concentrators, possibly because they took fewer and less rigorous academic courses than nonconcentrators at the beginning of the period. Nevertheless, as of 1998, occupational concentrators still took fewer and less rigorous academic courses than nonconcentrators.

For example, although the increase between 1982 and 1998 in mathematics credits earned by occupational concentrators was greater than the corresponding increase for nonconcentrators, occupational concentrators still earned fewer mathematics credits than nonconcentrators at the end of the period. In addition, although both occupational concentrators and nonconcentrators were more likely to take advanced mathematics coursework in 1998 than in 1982, nonconcentrators were more likely than concentrators to do so at the end of the period.

However, as of 1998, coursetaking differences between occupational concentrators and nonconcentrators in English, mathematics, and social studies were fairly small (with differences of less than 0.4 credits on average), and the level of coursetaking for both groups was fairly high (with more than 75 percent meeting the New Basics standards in these subjects[8]), compared with the level of science coursetaking. As of 1998, the gap between occupational concentrators and nonconcentrators in science coursetaking was significantly larger in chemistry than in biology.

Combining College-Preparatory and Occupational Coursework

In keeping with increased academic coursetaking in general, high school students became more likely to complete college-preparatory coursework over the period studied.[9] The percentage of public high school graduates completing college-preparatory coursework in high school increased from 8.7 percent for the class of 1982 to 38.9 percent for the class of 1998.

[8]The New Basics core academic standards include 4 years of English, and 3 years each of mathematics, science, and social studies (National Commission on Excellence in Education 1983).

[9]College-preparatory coursework is defined as earning 4.0 or more credits in English; 3.0 or more credits in mathematics at the Algebra 1 or higher level; 2.0 or more credits in biology, chemistry, or physics; 2.0 or more credits in social studies with at least 1.0 credit in U.S. or world history; and 2.0 or more credits in a single foreign language.

Students also became more likely to combine college-preparatory and occupational coursework over the period studied. Specifically, the percentage of public high school graduates completing both college-preparatory coursework and an occupational concentration in high school increased from 0.6 percent for the class of 1982 to 6.5 percent for the class of 1998. Similarly, the percentage of occupational concentrators who also completed college-preparatory coursework increased from 1.7 percent for 1982 graduates to 25.9 percent for 1998 graduates.

Related Academic and Occupational Coursetaking by Program Area

The report identified specific mathematics and science courses that were judged to be related to the 18 narrow occupational program areas in figure A. The report then compared the related-academic coursetaking rates for concentrators in specific occupational programs with the overall coursetaking rate for 1998 public high school graduates.

Based on this analysis, concentrators in several occupational program areas were found to have taken related academic courses at rates that were below the average rate for all 1998 public high school graduates. In particular, concentrators in construction, mechanics and repair, materials production, food service and hospitality, and personal and other services took all of the identified related academic courses at *below*-average rates. At the same time, concentrators in communications technology took some of their identified related academic courses at *above*-average rates.

However, concentrators in most program areas took related academic courses at rates that were not statistically different from the average for all graduates, including concentrators in agriculture, business services, business management, marketing, health care, computer technology, print production, and other precision production.

Foreword

In 1987, the National Center for Education Statistics (NCES) instituted a new approach to collecting and reporting data on vocational education. Under the new approach, vocational education data are collected primarily through general purpose surveys—including high school transcript studies—rather than separate vocational education questionnaires or studies. This arrangement allows NCES to situate vocational education activities within the broader education context. In 1998, a Technical Review Panel was formed to provide NCES with regular input on its Data on Vocational Education (DOVE) program, including surveys and reports.

This report updates and expands upon trends in high school vocational/technical coursetaking that were published in previous NCES reports, including the comprehensive *Vocational Education in the United States* series (Levesque et al. 1995, 2000; and Hoachlander, Kaufman, and Levesque 1992) and *Trends in Participation in Secondary Vocational Education: 1982–1992* (Tuma 1996). The current report provides a more detailed analysis of trends in high school vocational/technical coursetaking than was published previously, including trends in vocational/technical coursetaking overall, in technology education and computer-related coursetaking, and in the ways in which high school students combine vocational/technical and academic coursetaking.

Information on NCES' DOVE program and publications may be found at the following web site: *http://nces.ed.gov/surveys/dove*. Your comments about NCES vocational education publications are welcome and may be sent to Lisa Hudson, NCES, 1990 K Street NW, Suite 900, Washington, DC 20006 or *lisa.hudson@ed.gov*.

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Table of Contents

Page

List of Tables

Table **Page**

Appendix A

Table **Page**

Table **Page**

Table **Page**

Appendix B

Table **Page**

Table **Page**

Table **Page**

Table **Page**

Table **Page**

List of Figures

Figure **Page**

Figure **Page**

Figure **Page**

Figure **Page**

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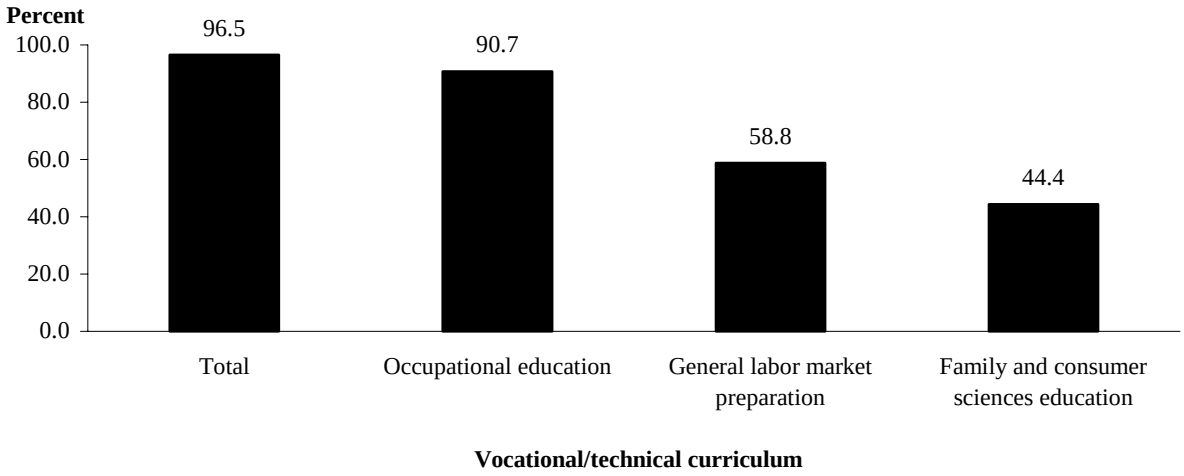
I. Introduction

Vocational/technical education is a common component of public high school education in the United States. In 1998, more than half (28) of the 50 states required some vocational/technical education for high school graduation.[1] Vocational/technical coursetaking is more extensive than these requirements would indicate, however, with most public high school graduates taking some vocational/technical education between grades 9 and 12. Among 1998 public high school graduates, 96.5 percent earned at least some credits in vocational/technical education in high school (figure 1 and table A1). In addition, 1998 graduates earned numbers of credits in vocational/technical education that were not significantly different on average from the numbers of credits they earned in English and in social studies, and they earned more credits in vocational/technical education than they did in mathematics, science, fine arts, or foreign languages (figure 2).

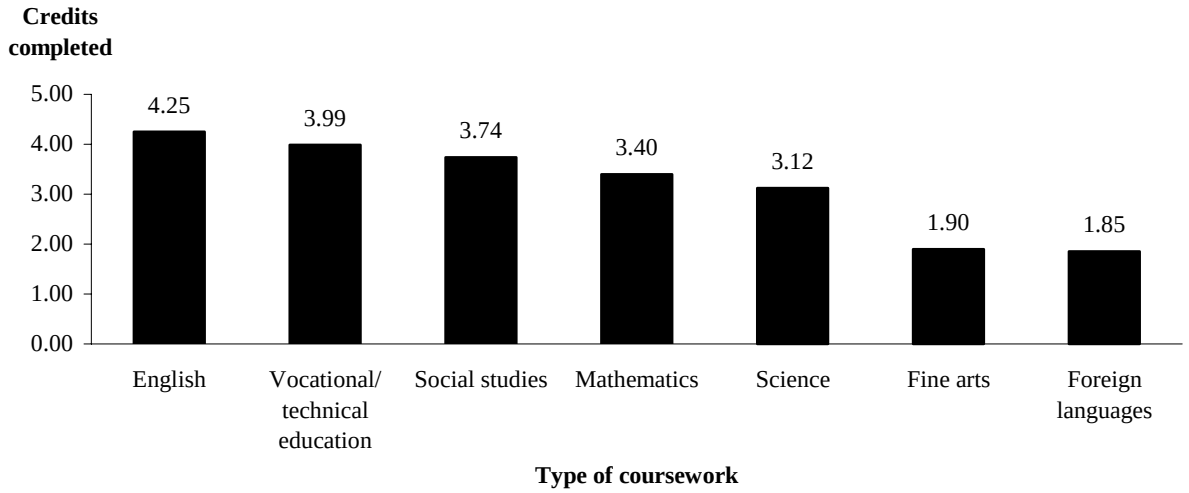
Figure 1. Percentage of public high school graduates taking vocational/technical education courses, by vocational/technical curriculum: 1998



SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Transcript Study (HSTS), 1998.

[1]These states variously required coursework in career education (including guidance), practical arts, computer education, free enterprise, technology, consumer education, and "vocational education." For the complete list of 1998 state graduation requirements, see Snyder and Hoffman (2001), table 154.

Figure 2. Average number of credits completed by public high school graduates, by type of coursework: 1998



SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Transcript Study (HSTS), 1998.

Purpose of the Report

The Carl D. Perkins Vocational and Applied Technology Act Amendments of 1998 (Perkins III) requires that the National Center for Education Statistics (NCES) collect and report information on vocational/technical education as part of its assessments. This report updates and expands upon trends in vocational/technical coursetaking that were published in the NCES report *Vocational Education in the United States: Toward the Year 2000* (Levesque et al. 2000). Specifically, this report examines vocational/technical coursetaking among public high school graduates between 1982 and 1998 by focusing on trends in three areas: in vocational/technical coursetaking overall, in technology education and computer-related coursetaking, and in the ways in which high school students combine vocational/technical and academic coursetaking. A companion report, *Public High School Graduates Who Participated in Vocational/Technical Education: 1982–1998* (Levesque forthcoming), examines trends in the participation of special and protected populations compared with other students.

The Policy and Labor Market Context: 1982–98

To set the stage for this analysis, the report first reviews education policy and labor market trends that form the background for students' vocational/technical coursetaking over the period studied.

School Reform Efforts

In 1983, *A Nation at Risk* focused attention on shortcomings in the nation's public schools (National Commission on Excellence in Education 1983). The bipartisan report linked poor economic productivity and worker skill deficits to a lack of rigor in public education. While the report made specific recommendations for high school graduation requirements, it also sounded the education alarm generally. Many state policymakers responded during the 1980s by increasing high school graduation requirements. From 1980 to 1990, 39 states increased the total number of credits they required for high school graduation,[2] although the number of states meeting the Commission's recommendations for core academic subjects[3] only rose from 1 to 3 states (tables 1a and 1b). During the 1990s, state reform efforts continued. By 1998, for example, 2 more (net) states had increased their total graduation requirements, and 10 additional states had met the core academic recommendations specified in *A Nation at Risk.*

The Carl D. Perkins Vocational and Applied Technology Act Amendments of 1990 (Perkins II) called for reforming vocational/technical education in ways that reflected national efforts to improve academic achievement. Perkins II required that states develop performance measures and standards for evaluating vocational/technical programs, including a measure of the academic achievement gains of vocational/technical participants. Perkins II also called for integrating academic and vocational/technical education and developing tech-prep programs that span the last 2 years of high school and the first 2 years of college.[4] The Perkins II reforms intended in part to improve the academics that students received *in* their occupational courses as well as the academics they took *in combination with* their occupational courses. That is, the reforms envisioned participation in vocational/technical education partly as a vehicle for improving academic achievement, separate from and combined with academic reforms.

In 1994, the School-to-Work Opportunities Act (STWOA) was passed to encourage states to better prepare all students for college *and* work. It emphasized three key practices: integrating academic and vocational/technical education, integrating school- and work-based learning, and developing secondary and postsecondary linkages. While STWOA reflected the national emphasis on academic achievement (that is, preparation for college or further education), it also provided an equal emphasis on education for work. Among its provisions, STWOA called for better

[2]This number includes 8 states that instituted high school graduation requirements where previously there were none.

[3]The report recommended that all high school graduates take 4 years of English and 3 years each of mathematics, science, and social studies.

[4]Perkins III repeated these reform directives, while also fine-tuning them. The most recent high school transcript study that was available when this analysis was undertaken was conducted in 1998, however, so it was not possible for this report to examine trends in vocational/technical coursetaking following implementation of Perkins III.

Table 1a. Number of total credits required by each of the 50 states to graduate from high school with a standard diploma: 1980, 1990, and 1998

	Year			Change		
	1980	1990	1998	1980 to 1990	1990 to 1998	1980 to 1998
Alabama	20	22	24	2	2	4
Alaska	19	21	21	2	0	2
Arizona	16	20	20	4	0	4
Arkansas	16	20	21	4	1	5
California	—	13	13	†	0	†
Colorado	—	—	—	†	†	†
Connecticut	—	20	20	†	0	†
Delaware	18	19	19	1	0	1
Florida	—	24	24	†	0	†
Georgia	20	21	21	1	0	1
Hawaii	20	20	22	0	2	2
Idaho	18	21	21	3	0	3
Illinois	16	16	16	0	0	0
Indiana	16	20	20	4	0	4
Iowa	—	—	—	†	†	†
Kansas	17	21	21	4	0	4
Kentucky	18	20	22	2	2	4
Louisiana	20	23	23	3	0	3
Maine	—	16	16	†	0	†
Maryland	20	20	21	0	1	1
Massachusetts	—	—	—	†	†	†
Michigan	—	—	—	†	†	†
Minnesota	15	20	—	5	†	†
Mississippi	16	18	20	2	2	4
Missouri	20	22	22	2	0	2
Montana	16	20	20	4	0	4
Nebraska	—	—	—	†	†	†
Nevada	19	23	23	4	0	4
New Hampshire	16	20	20	4	0	4
New Jersey	—	22	22	†	1	†
New Mexico	20	23	23	3	0	3
New York	16	19	21	3	2	5
North Carolina	16	20	20	4	0	4
Northa Dakota	17	17	17	0	0	0
Ohio	17	18	18	1	0	1
Oklahoma	18	20	21	2	1	3
Oregon	21	22	22	1	0	1
Pennsylvania	13	21	21	8	0	8
Rhode Island	16	16	16	0	0	0
South Carolina	18	20	20	2	0	2
South Dakota	16	20	20	4	0	4
Tennessee	18	20	20	2	0	2
Texas	18	21	22	3	1	4
Utah	15	24	24	9	0	9
Vermont	—	16	15	†	-1	†
Virginia	18	21	22	3	1	4
Washington	—	19	19	†	0	†
West Virginia	18	21	21	3	0	3
Wisconsin	—	13	22	†	9	†
Wyoming	18	18	13	0	-5	-5

—Indicates that local school boards set high school graduation requirements.

†Not applicable.

SOURCE: Education Commission of the States (1990); Snyder and Hoffman (1992), table 145, and Snyder and Hoffman (2001), table 154.

Table 1b. Number of the 50 states meeting or exceeding the New Basics core academic requirements,[1] by whether states met or exceeded the New Basics core academic requirements in each year: 1980, 1990, and 1998

	1980	1990	1998
Total	1	3	13
Alabama			✓
Alaska			
Arizona	—	—	—
Arkansas			✓
California	—		
Colorado	—	—	—
Connecticut	—		
Delaware			
Florida	—	✓	
Georgia			✓
Hawaii	✓		✓
Idaho			
Illinois			
Indiana			
Iowa	—	—	—
Kansas			
Kentucky			✓
Louisiana		✓	✓
Maine	—		
Maryland			✓
Massachusetts	—	—	—
Michigan	—	—	—
Minnesota			—
Mississippi			✓
Missouri			
Montana			
Nebraska	—	—	—
Nevada			
New Hampshire			
New Jersey	—		
New Mexico			
New York			
North Carolina			✓
Northa Dakota			
Ohio			
Oklahoma			
Oregon			
Pennsylvania		✓	✓
Rhode Island			
South Carolina			
South Dakota			
Tennessee			✓
Texas			
Utah			
Vermont	—		
Virginia			✓
Washington	—		
West Virginia			
Wisconsin	—		
Wyoming			✓

—Indicates that local school boards set high school graduation requirements.

✓State graduation requirements met or exceeded the New Basics core academic requirements.

[1]The New Basics core academic requirements include 4 years of English and 3 years each of mathematics, science, and social studies.

SOURCE: Education Commission of the States (1990); Snyder and Hoffman (1992), table 145, and Snyder and Hoffman (2001), table 154.

career preparation, through career guidance and work experience activities, and the development of high school programs of study called "career majors" or "career pathways."

The focus on academic achievement during the 1980s and 1990s may have influenced vocational/technical coursetaking over this period in a number of different ways. After taking more academic courses, students may have had less time to devote to other coursework, including vocational/technical education. However, attention to the academic achievement of participants in vocational/technical education may have made vocational/technical education an alternative path for learning academics during the 1990s. In addition, emphasis on preparing all students for both college and work may have bolstered vocational/technical coursetaking in recent years. Although this report does not seek to evaluate the impact of particular federal policies, these policies set the context in which the trends examined in this report occurred.

Labor Market Trends

Long-term trends in labor market demand for higher skills may also have influenced vocational/technical coursetaking over the period studied (Levesque et al. 2000). On the one hand, increased demand for academic skills and higher levels of education may have reduced vocational/technical coursetaking. Some graduates who may previously have terminated their education with high school or a postsecondary certificate or associate's degree may now pursue a bachelor's or higher degree.[5] Thus, students may take fewer vocational/technical courses in high school as they shift their educational plans and aspirations toward 4-year or higher degrees.

On the other hand, demand for greater technical skills and degrees—particularly resulting from the technology boom of the 1990s—may have increased vocational/technical coursetaking. These increases may have occurred for all students because all workers may arguably need technology-related skills regardless of when they enter the labor market. Alternatively, increases in technology-related coursework in high school may be greater for students planning to enter the labor market directly after high school or after completing 1- or 2-year postsecondary programs because these students have less time in which to acquire technology-related skills before obtaining employment.

Changes in the demand for specific types of jobs may also lead to occupational coursetaking changes, and these changes may not reflect overall vocational/technical coursetaking patterns. For example, labor market shifts away from manufacturing toward services and information in-

[5]The trend toward higher educational attainment among the U.S. population is well documented. See, for example, Levesque et al. (2000), pp. 149–151. Vocational/technical education is defined at the federal level as preparing students for careers requiring less than a bachelor's degree.

dustries have been accompanied, to some extent, by corresponding changes in coursetaking in related vocational/technical program areas (Levesque et al. 2000; Hurst and Hudson 2000).

Research Questions

It is not possible in this analysis to determine the causal impact of education policies and labor market trends on vocational/technical coursetaking. However, based on the policy and labor market trends discussed above, this report seeks to address the following research questions:

1. What have been the trends in vocational/technical coursetaking between 1982 and 1998? Are changes evident across the board or focused in particular areas of the vocational/technical curriculum?
2. Has the nature of vocational/technical coursetaking changed, and, if so, how? What types—and what mix—of vocational/technical courses were students taking as of 1998?
3. What vocational/technical areas exhibit increases in coursetaking? In particular, has coursetaking in technology education and computer-related areas risen? What vocational/technical areas exhibit decreases in coursetaking?
4. How have students combined academic and vocational/technical coursetaking over the period studied? To what extent have the rates of academic coursetaking among participants in vocational/technical education risen between 1982 and 1998, and how does this increase compare with the rates of academic coursetaking among other students? To what extent do students take academic coursework that is related to their occupational coursework?

Description of the Data

This report analyzes trends in vocational/technical and academic coursetaking by examining high school transcripts for the graduating classes of 1982, 1990, 1992, 1994, and 1998.[6] The analysis focuses on public high school graduates who earned regular or honors diplomas.[7] A detailed description of the data surveys and the rules for including students in the analysis population are provided in appendix D. Trends are limited to the years studied; that is, although the data

[6]These transcript studies were conducted as part of the High School and Beyond (HS&B) Sophomore Cohort Study (1982 graduates), the National Education Longitudinal Study of 1988 (NELS, 1992 graduates), and the High School Transcript Studies (HSTS) of 1990, 1994, and 1998 (1990, 1994, and 1998 graduates, respectively).

[7]The HS&B and NELS studies excluded students with the most severe disabilities, where it was determined by school staff that these students were unable to complete the lengthy student questionnaires that were a part of these studies. In order to ensure comparability across the data sets, graduates with special education diplomas were excluded from the HSTS samples (Gifford et al. 1989; Tuma 1996). Thus, the samples used for this trend analysis were consistent with the population of public high graduates, including students with disabilities, who earned regular or honors diplomas in each of the study years. This restriction is consistent with NCES reports on high school vocational/technical coursetaking published over the last decade and is consistent with NCES procedures for transcript studies (Alt and Bradby 1999). In addition, there are some minor coding differences between NELS and the other transcript data that may affect the data for 1992. See appendix D for more information.

may indicate a decline from 1982 to 1992 after which no significant changes were detected, the low point may have been reached in 1991 or 1993, or there may have been unobservable spikes (highs or lows) in unexamined years. It is assumed in this report, however, that if a consistent trend appears in the data, then a trend existed throughout the period highlighted by the survey years.

Transcripts provide information on the courses that public high school graduates took in grades 9 through 12. For simplicity's sake, the report refers to this information as "high school coursetaking." With the exception of the section on vocational/technical coursetaking by grade level, which examines coursetaking in each grade 9 through 12 separately, the report describes the cumulative coursework that graduates took in high school.

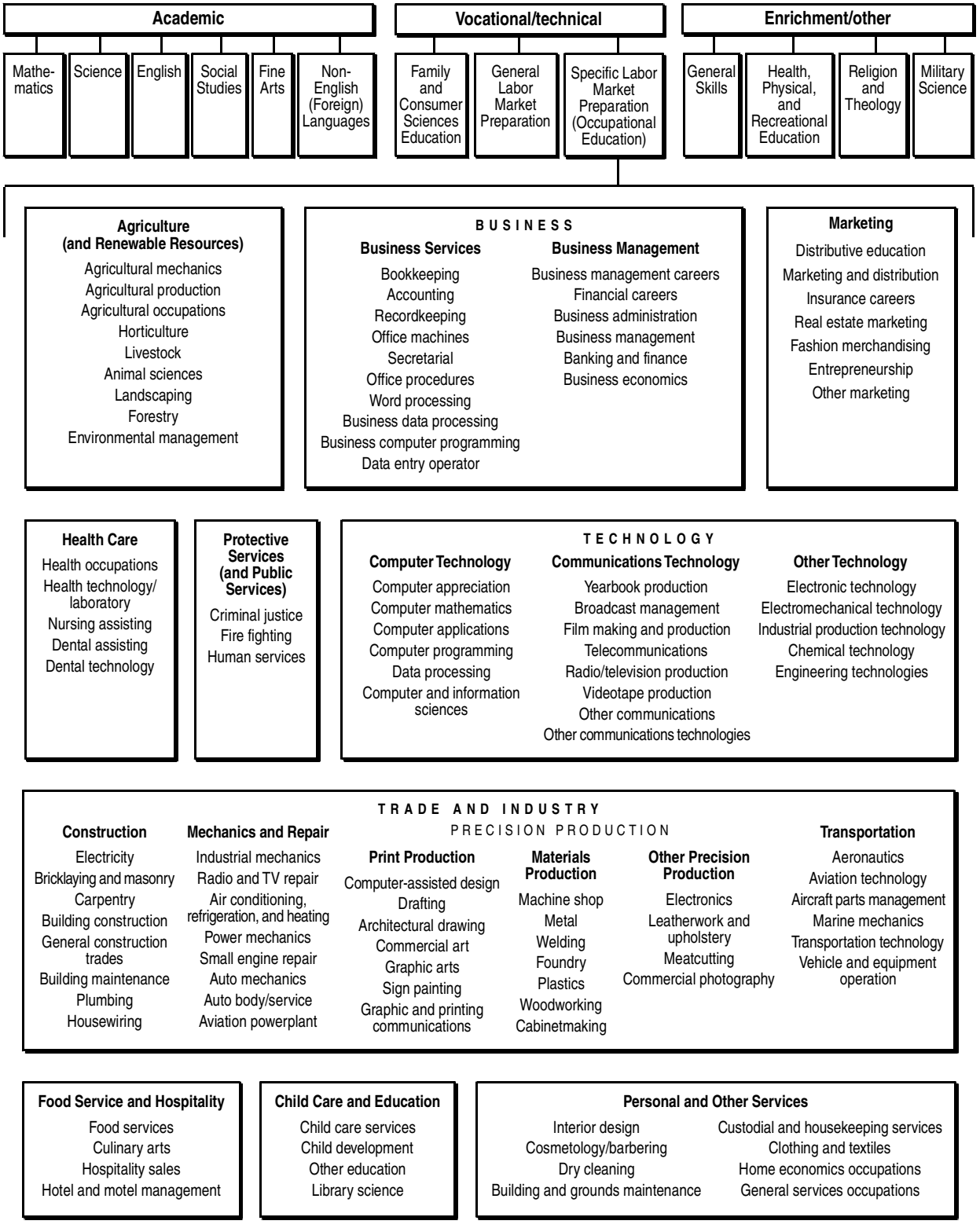
Researchers assigned codes to each course on a transcript according to the Classification of Secondary School Courses (CSSC) (Westat 1992). The analysis for this report then used the Secondary School Taxonomy (SST) to classify these codes into broader course groupings (Bradby and Hoachlander 1999). As figure 3 shows, the SST classifies high school courses into three main areas (academic, vocational/technical, and enrichment/other) and their curricular subareas. The same course classification was applied to each of the five data surveys used in the analysis so that coursetaking was defined consistently over time.

In addition to the name of a course, the transcripts also provide the number of credits a student earned for each course. Credits have been standardized across the survey years, so that 1.0 credit is equivalent to completing a course that meets one period per day for an entire school year. This is equivalent to a standard Carnegie unit. However, for simplicity's sake, the report refers to credits rather than Carnegie units.

Some Limitations of Transcript Studies

Transcript studies provide a reliable source of information on student coursetaking. These studies do have some limitations, however. First, transcript studies can describe the intended—but not the actual—curriculum. That is, researchers classify the courses listed on transcripts based on course catalogs provided by participating schools. Teachers may or may not adhere strictly to the official catalog description when teaching a course. Often, different teachers in a school will cover different materials on any given day—and even over an entire semester or school year—and may use different instructional practices. When examining courses with similar names and descriptions from schools across the nation, researchers are likely to find an even wider variation in content than is present in a single school. Thus, they cannot determine from transcript studies the actual content students were exposed to when they took a particular course.

Figure 3. Secondary school taxonomy



SOURCE: Adapted from Bradby, D. and Hoachlander, E.G. (1999). *1998 Revision of the Secondary School Taxonomy* (NCES 1999–06). U.S. Department of Education. Washington, DC: National Center for Education Statistics Working Paper.

Second, the CSSC and the SST rarely make it possible to identify courses taught using particular instructional methodologies. To classify the courses listed on transcripts, researchers may consider both content and instructional methodology and then assign an appropriate CSSC code to a course. For example, they may assign one CSSC code to courses teaching general mathematics, while they may assign a different code to courses teaching general mathematics through applied methods. However, it is not always possible to determine the instructional methodology used from a course title or even from a course description. Therefore, not all CSSC codes distinguish among instructional methodologies. The SST organizes these CSSC codes into broader course groupings, and the 1998 revision of the SST focused on content rather than pedagogy in assigning courses. For example, both general mathematics and applied general mathematics courses are included under the General Mathematics content area of the SST. Although experts considered adding flags to course codes to indicate instructional methodology, they decided not to do so because of the limitations mentioned here (see Bradby and Hoachlander 1999, pp. 50–51).

A final limitation of transcript studies is that they cannot provide reliable information about what students have learned from a course. Rather, they can only indicate the content that students may have been exposed to by taking a particular course. For example, although a student may have earned 1.0 credit in algebra 1, it is not possible to infer the level of algebra competency a student achieved through this coursework. Even examining grades in combination with course-taking does not produce reliable information about student achievement. Although one might assume that students earning A's in algebra 1 courses achieved a higher level of competency than students earning C's in these courses, it is impossible to infer a particular level of competency because of inconsistency in grading practices and course content. Generally, one must use standardized achievement test results to describe the actual achievement levels of students in the areas tested.

Despite these limitations, transcript studies are a useful tool for examining trends in the types and combinations of courses that students take over time. To do so, researchers using transcripts make a couple of assumptions. First, they assume that variation in content occurs less within courses with the same course code or classification than it does across courses with different codes or classifications. Second, they assume that the variation within courses with the same course code or classification remains relatively constant over time. By making such assumptions, they can infer whether students are taking different types of courses or more or less rigorous coursework in a subject area or are combining coursework in different ways over time.

Terms Used in the Report

Many terms used in the report are defined in appendix C, which provides a quick reference.

The Vocational/Technical Curriculum

High school vocational/technical education encompasses three different subcurricula: specific labor market preparation or "occupational education,"[8] general labor market preparation, and family and consumer sciences education (figure 3). Occupational education consists of courses that teach skills and knowledge required in a particular occupation or set of related occupations. For example, health care programs may prepare students specifically for dental assisting or nursing assisting, or more broadly for general health occupations. Although traditionally the main purpose of occupational education was to prepare students for entering specific occupations, occupational education may also prepare students for entering a related vocational/technical program in college. Based on SST classifications, occupational education in this report consists of the 10 broad and 18 narrow program areas shown in figure 3.

Occupational courses within a program area are divided into four categories: first-level, second- or higher-level, cooperative education, and specialty courses. The first three categories generally represent sequential coursetaking. For example, in some high schools, a planned occupational program of study may include health occupations 1 in the 10th grade, health occupations 2 in the 11th grade, and health occupations cooperative education in the 12th grade. In other high schools, health occupations cooperative education may follow health occupations 1, either with or without concurrent enrollment in health occupations 2. Other high schools may offer 2 years of health occupations cooperative education courses following a first and/or second course. In addition to these generally sequential courses, some high schools offer specialty courses in a program area. In some cases, specialty courses offer more specialized occupational training (such as home health aide), while in others they provide related skills that can be applied to a range of occupations (such as medical terminology). Students may take specialty courses to satisfy a particular interest in a topic or to obtain skills that are broadly applicable to a career field or for other reasons. For purposes of this analysis, second- or higher-level and cooperative education courses were considered to represent *advanced* coursework in a program area.

General labor market preparation consists of courses that teach general employment skills that are not specific to one occupational area, such as basic typewriting/keyboarding, introductory technology education, and career preparation and general work experience courses. Family and

[8]For simplicity's sake, this report uses the term "occupational education" in place of "specific labor market preparation."

consumer sciences education consists of courses intended to prepare students for family and consumer roles outside the paid labor market.[9]

As of 1998, 90.7 percent of public high school graduates earned credits in occupational education in high school, 58.8 percent in general labor market preparation, and 44.4 percent in family and consumer sciences education (figure 1 and table A1).

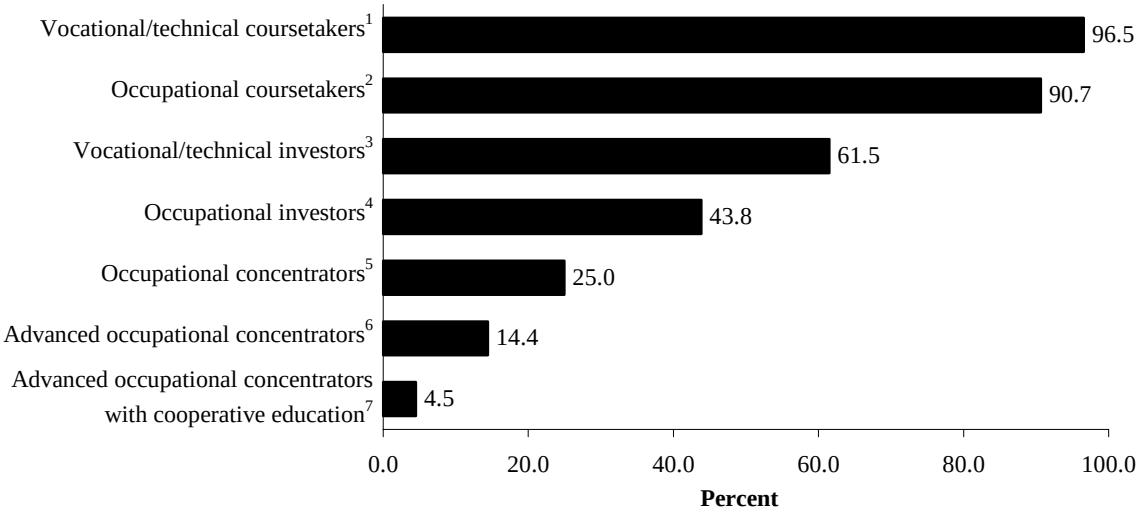
Key Measures of Participation

Although vocational/technical coursetaking is prevalent in high schools, students take varying amounts and types of these courses and take them for different purposes. Some students seek only to meet the minimum high school graduation requirements. Others take typewriting or keyboarding to help them complete homework assignments in either high school or college or to obtain a general employability skill. Some take consumer education courses with an eye toward future homemaking. Others take computer education courses to prepare generally for the labor market. Some take a sequence of related occupational courses to prepare for work in a specific occupation and/or entry into a related vocational/technical program in college, while others take occupational courses from one or more program areas to help identify a possible college major or future career. Still others "shop around" in high school, sampling courses from both the vocational/technical and academic curricula with no clear goals in mind (Powell, Cohen, and Farrar 1985).

Because of the many ways that students participate in the vocational/technical curriculum, it is important to examine a range of measures when analyzing participation trends. Figure 4 and table A2 show the main measures that are used in this report. Because policymakers are most concerned about participation in vocational/technical education overall, and in occupational education in particular, the listed measures provide several lenses for examining these two curricula. According to the least restrictive measure—the percentage of public high school graduates who were vocational/technical coursetakers—almost all 1998 graduates (96.5 percent) participated in the vocational/technical curriculum. According to the most restrictive measure—the percentage of graduates who were occupational concentrators with cooperative education—just 4.5 percent of 1998 graduates were counted as participating in vocational/technical education. The measures are defined in ascending order of restrictiveness below, and there is considerable overlap among the measures.

[9]Home economics-related courses that prepare students for the paid labor market are included under occupational education, in the child care and education, food service and hospitality, and personal and other services program areas.

Figure 4. Percentage of public high school graduates meeting different measures of participation in vocational/technical education: 1998



[1]Graduates earning greater than 0.0 credits in vocational/technical education.

[2]Graduates earning greater than 0.0 credits in occupational education.

[3]Graduates earning 3.0 or more credits in vocational/technical education.

[4]Graduates earning 3.0 or more credits in occupational education, regardless of whether they concentrate their occupational coursetaking in a single program area.

[5]Graduates earning 3.0 or more credits in one of the following 10 broad occupational program areas: agriculture, business, marketing, health care, protective services, technology, trade and industry, food service and hospitality, child care and education, and personal and other services.

[6]Graduates earning 3.0 or more credits in one of the 10 broad occupational program areas, with at least 1.0 advanced credit in that program area. Advanced occupational coursework includes second- or higher-level courses and cooperative education courses.

[7]Graduates earning 3.0 or more credits in one of the 10 broad occupational program areas, with at least 1.0 cooperative education credit in that program area.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Transcript Study (HSTS), 1998.

Vocational/technical coursetakers—Graduates earning greater than 0.0 credits in vocational/technical education in high school. All of the following groups of students are subsets of this group.

Occupational coursetakers—Graduates earning greater than 0.0 credits in occupational education in high school. This group is a subset of the previous group.

Vocational/technical investors[10]—Graduates earning 3.0 or more credits in vocational/technical education in high school. All of the following groups of students are subsets of this group.

Occupational investors—Graduates earning 3.0 or more credits in occupational education in high school, regardless of whether they concentrate their occupational coursetaking in a single program area. This measure is a subset of the previous measure.

Occupational concentrators—Graduates earning 3.0 or more credits in high school in one of the 10 broad occupational program areas listed in figure 3.[11] This measure is a subset of the previous measure. In some cases, the report also provides information on graduates concentrating (earning 3.0 or more credits) in one of the 18 narrow occupational program areas in figure 3.[12]

Advanced occupational concentrators—Graduates earning 3.0 or more credits in high school in one of the 10 broad occupational program areas listed in figure 3, with at least 1.0 advanced credit in that program area. Advanced occupational coursework includes second- or higher-level courses and cooperative education courses, as described above. This measure is a subset of the previous measure. For simplicity's sake, this group is sometimes referred to in the report as "advanced concentrators."

Advanced occupational concentrators with cooperative education—Graduates earning 3.0 or more credits in high school in one of the 10 broad occupational program areas listed in figure 3, with at least 1.0 cooperative education credit in that program area.[13] This measure is a subset of the previous measure. For simplicity's sake, this group is sometimes referred to in the report as "concentrators with cooperative education."

In addition to tracking the percentages of public high school graduates satisfying the participation measures mentioned above, the report also examines trends in the average number of credits earned by public high school graduates in vocational/technical areas.

[10]The terms "investor" and "concentrator" refer to specific patterns of coursetaking rather than to students' intentions.

[11]This classification was also used in Levesque et al. (2000), in which students were referred to as "vocational concentrators."

[12]Students concentrating in one of the 18 narrow occupational program areas in figure 3 represent a majority of all occupational concentrators. However, in some cases, graduates earned 3.0 or more credits in "mixed" business, technology, precision production, and trade and industry areas without earning 3.0 or more credits in one of the narrow programs within these broad areas. Where applicable, information on these "mixed" concentrators is provided.

[13]Cooperative education awards school credit for work experience that is related to a student's occupational program and typically alternates work placements and classroom time.

Although all of the above measures are discussed in this report, the report emphasizes the coursetaking patterns of occupational concentrators because this group is a common focus of federal and state accountability and research efforts for vocational/technical education (Office of Vocational and Adult Education 2002; Silverberg et al. 2002).[14]

[14]The Office of Vocational and Adult Education (2002) and Silverberg (2002) refer to this group as "vocational" concentrators.

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II. Trends in Vocational/Technical Coursetaking

This chapter examines trends in vocational/technical coursetaking in high school overall, as well as trends in vocational/technical coursetaking by grade level, occupational coursetaking by program area, concentrating in occupational education, and work-based learning. It also explores the relationship between changes in vocational/technical coursetaking and state high school graduation requirements.

Trends in Vocational/Technical Coursetaking

Overall Trends in Vocational/Technical Coursetaking

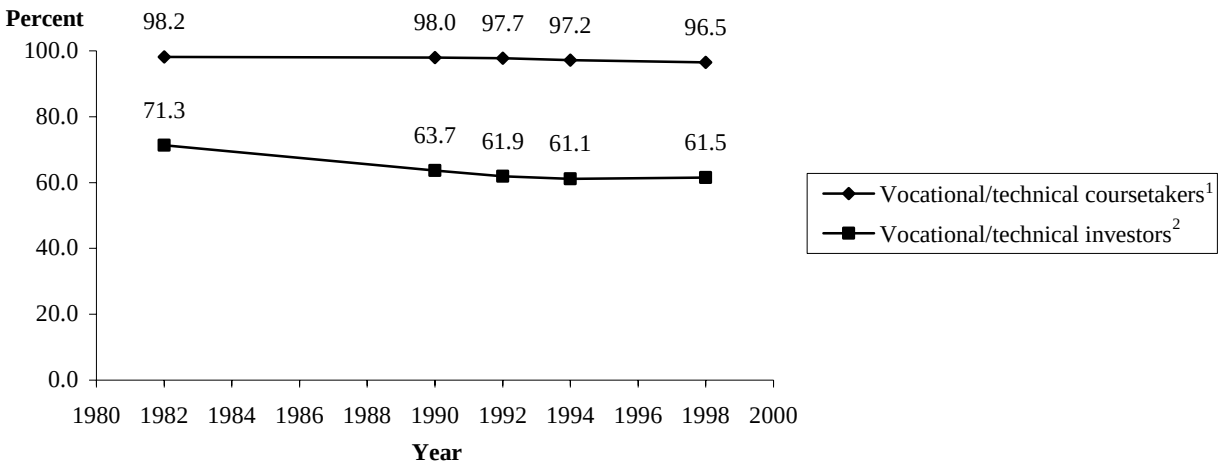
Over the period studied, the primary change in vocational/technical coursetaking was not in the proportion of high school students participating in vocational/technical education but in the amount of vocational/technical education they took. That is, the breadth of vocational/technical coursetaking declined slightly, while the depth of this coursetaking declined more steeply. However, most declines in vocational/technical coursetaking occurred by the early 1990s.

Between 1982 and 1998, almost all public high school graduates (between 98.2 percent and 96.5 percent) earned at least some credits in vocational/technical education in high school (figure 5 and table A2).[15] However, the average number of credits that public high school graduates earned in vocational/technical education decreased from 4.68 credits for the class of 1982 to 4.19 credits for the class of 1990, after which no significant changes were detected (figure 6). Similarly, the percentage of graduates earning 3.0 or more credits in vocational/technical education in high school (defined as "vocational/technical investors" in chapter I) declined from 71.3 percent for 1982 graduates to 63.7 percent for 1990 graduates (figure 5 and table A2). As of 1998, 61.5 percent of graduates invested 3.0 or more credits in vocational/technical education in high school.[16]

[15]The slight decrease from 98.2 percent for 1982 graduates to 96.5 percent for 1998 graduates was statistically significant.

[16]The difference in rates of investing in vocational/technical education for 1990 and 1998 graduates was not statistically significant.

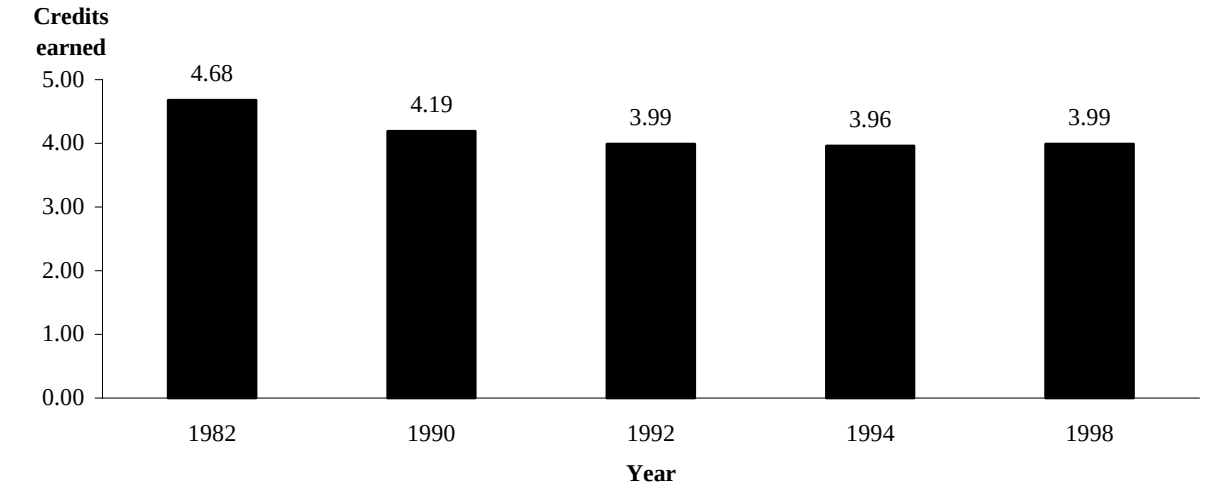
Figure 5. Percentage of public high school graduates who were vocational/technical coursetakers and investors: Various years, 1982–98



[1]Graduates earning greater than 0.0 credits in vocational/technical education.
[2]Graduates earning 3.0 or more credits in vocational/technical education.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982; National Education Longitudinal Study of 1988 (NELS:88), Second Follow-up Survey and High School Transcript Study, 1992; and High School Transcript Studies (HSTS), 1990, 1994, and 1998.

Figure 6. Average number of credits earned in vocational/technical education by public high school graduates: Various years, 1982–98

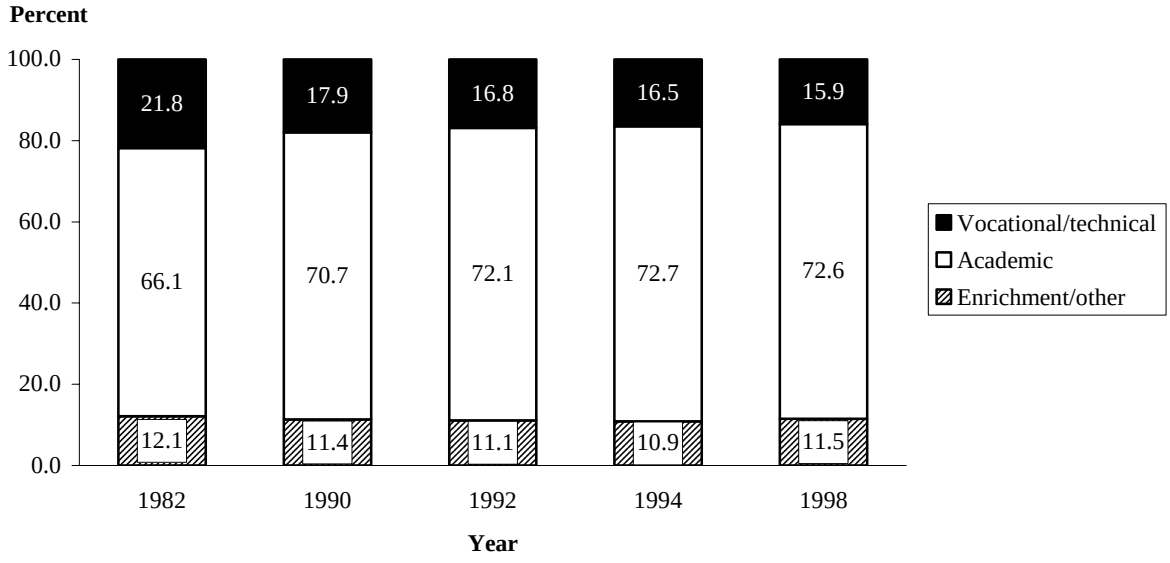


NOTE: Years are not spaced proportionally.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982; National Education Longitudinal Study of 1988 (NELS:88), Second Follow-up Survey and High School Transcript Study, 1992; and High School Transcript Studies (HSTS), 1990, 1994, and 1998.

Although most of the decline in average number of vocational/technical credits earned by graduates occurred by 1990, vocational/technical credits represented a declining share of the total high school credits that graduates earned throughout the 1980s and 1990s. Specifically, the share of total credits earned in high school by graduates that were vocational/technical credits decreased from 21.8 percent for 1982 graduates to 17.9 percent for 1990 graduates and then decreased further to 15.9 percent for 1998 graduates (figure 7). These relative declines were due to public high school graduates earning on average more academic credits and, to a lesser extent, more enrichment/other credits in high school over the period studied. Specifically, the number of academic credits earned on average by public high school graduates increased from 14.28 credits for 1982 graduates to 17.22 credits for 1992 graduates, and then to 18.26 credits for 1998 graduates (figure 8).[17] Between 1982 and 1998, the average number of credits that graduates earned in enrichment/other courses increased from 2.64 credits to 2.89 credits.[18]

Figure 7. Percentage distribution of total credits earned by public high school graduates, by curriculum: Various years, 1982–98



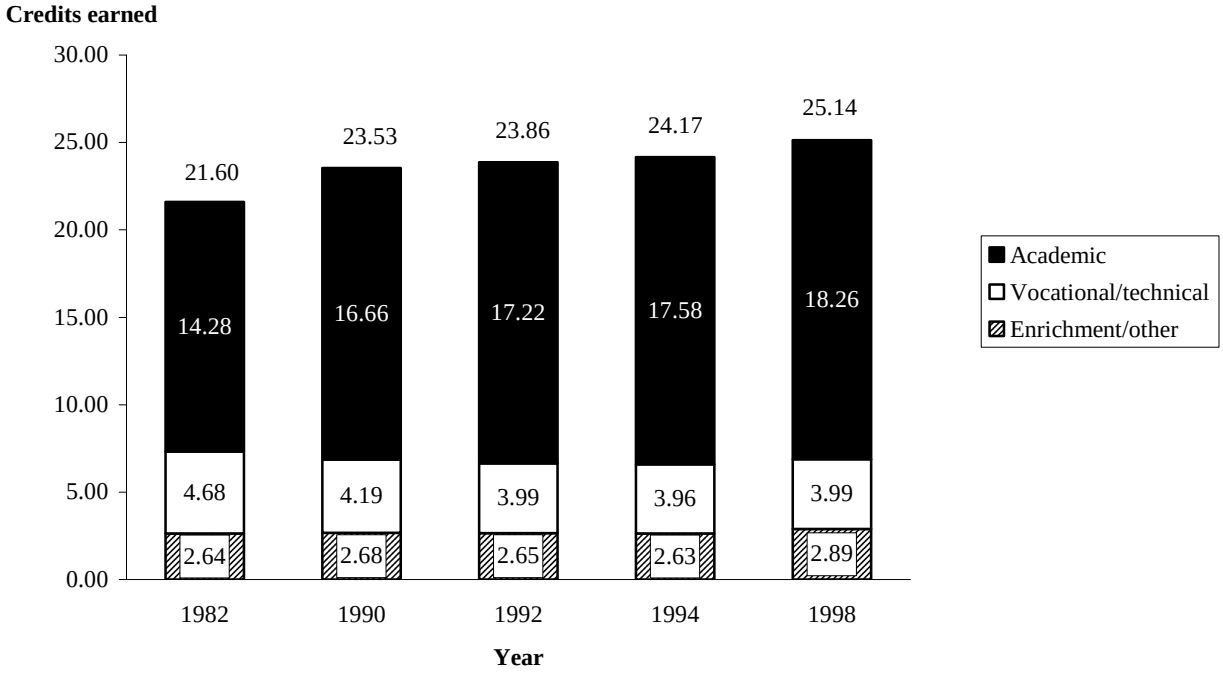
NOTE: Detail may not sum to totals because of rounding. Years are not spaced proportionally.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982; National Education Longitudinal Study of 1988 (NELS:88), Second Follow-up Survey and High School Transcript Study, 1992; and High School Transcript Studies (HSTS), 1990, 1994, and 1998.

[17]The apparent increase between 1992 and 1994 was not statistically significant, although all other increases over this period were statistically significant.

[18]The change in enrichment/other credits earned was smaller than the changes in credits earned in academic and vocational/technical courses.

Figure 8. Average number of credits earned by public high school graduates, by curriculum: Various years, 1982–98



NOTE: Detail may not sum to totals because of rounding. Years are not spaced proportionally.

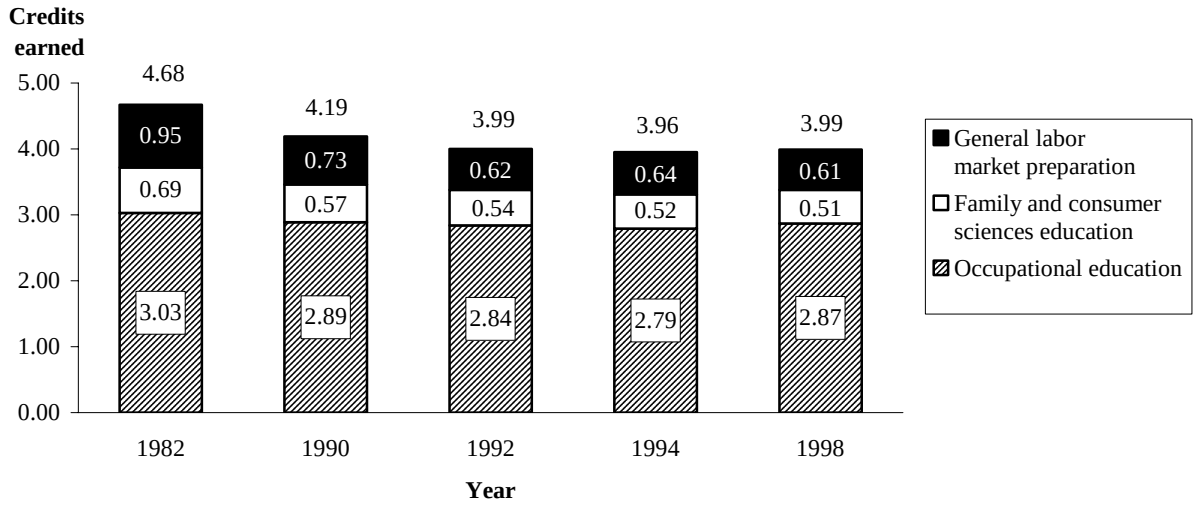
SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982; National Education Longitudinal Study of 1988 (NELS:88), Second Follow-up Survey and High School Transcript Study, 1992; and High School Transcript Studies (HSTS), 1990, 1994, and 1998.

Trends in the Three Vocational/Technical Subcurricula

As explained in chapter I, vocational/technical education consists of occupational education, general labor market preparation, and family and consumer sciences education. Relative changes in coursetaking in these three subcurricula signal changes in the nature of vocational/technical coursetaking in high school.

The decrease in vocational/technical credits earned over the period studied was due primarily to a decrease in general labor market preparation coursetaking in high school. Comparing the classes of 1982 and 1998, the number of general labor market preparation credits earned by public high school graduates declined by 0.34 credits on average (figure 9). In contrast, over this period, the number of credits that graduates earned in family and consumer sciences education declined by 0.18 credits on average, while there was no statistically significant change in the

Figure 9. Average number of credits earned in vocational/technical education by public high school graduates, by vocational/technical curriculum: Various years, 1982–98



NOTE: Detail may not sum to totals because of rounding. Years are not spaced proportionally.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982; National Education Longitudinal Study of 1988 (NELS:88), Second Follow-up Survey and High School Transcript Study, 1992; and High School Transcript Studies (HSTS), 1990, 1994, and 1998.

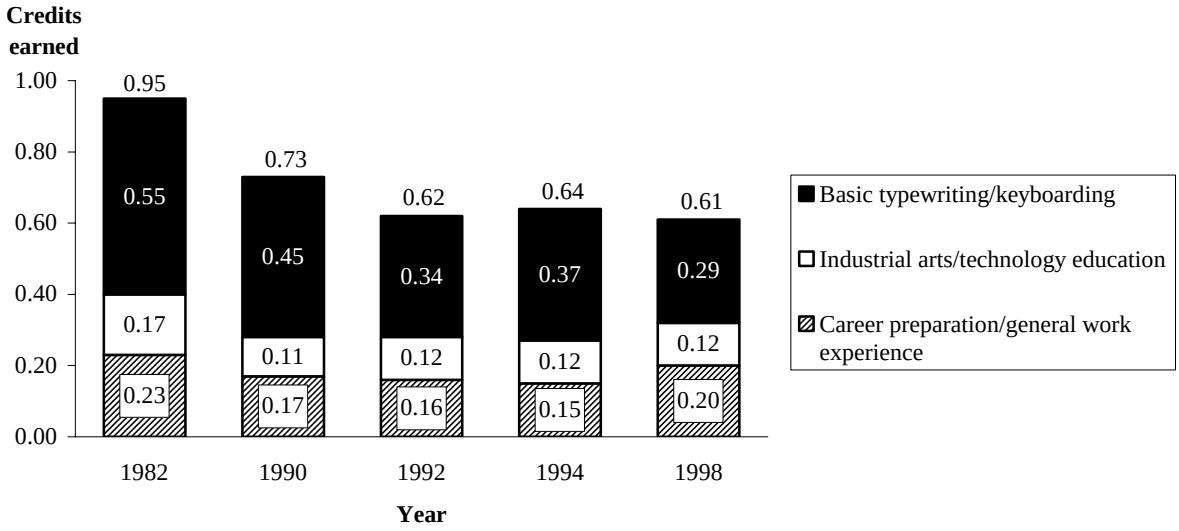
average number of credits that graduates earned in occupational education.[19] Paralleling declines in vocational/technical coursetaking overall, declines in general labor market preparation coursetaking occurred primarily by the early 1990s. The average number of credits that public high school graduates earned in general labor market preparation decreased from 0.95 credits for the class of 1982 to 0.62 credits for the class of 1992, after which no significant changes were detected.

The decrease in general labor market preparation credits earned was due primarily to a decrease in the number of basic typewriting/keyboarding courses that graduates took in high school (figure 10 and table A3). Comparing the classes of 1982 and 1998, the number of credits that public high school graduates earned in basic typewriting/keyboarding declined by 0.26 credits on average, about three-quarters of the total general labor market preparation decline of 0.34 credits.

As with vocational/technical coursetaking overall, the *breadth* of occupational coursetaking was fairly high over the period studied. Most public high school graduates (between 88.7 percent

[19]Although the average number of credits that graduates earned in occupational education appeared to decline by 0.16 credits between 1982 and 1998, this apparent decline was not statistically significant.

Figure 10. Average number of credits earned in general labor market preparation by public high school graduates, by area: Various years, 1982–98



NOTE: Detail may not sum to totals because of rounding. Years are not spaced proportionally.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982; National Education Longitudinal Study of 1988 (NELS:88), Second Follow-up Survey and High School Transcript Study, 1992; and High School Transcript Studies (HSTS), 1990, 1994, and 1998.

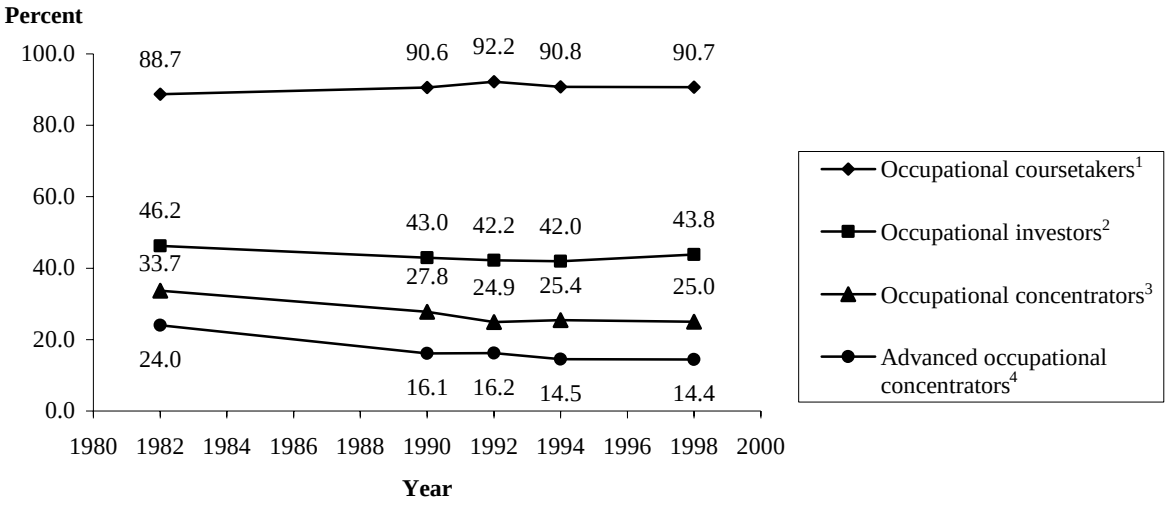
and 92.2 percent) earned at least some occupational credits in high school during this period (figure 11 and table A2).[20] However, compared with vocational/technical coursetaking, the *amount* of occupational education that graduates took remained relatively steady between 1982 and 1998. The average number of occupational credits that 1998 public high school graduates earned in high school (2.87 credits) was not statistically different from the average number earned by 1982 graduates (3.03 credits) (figure 9). Similarly, the percentage of 1982 public high school graduates who earned 3.0 or more credits in occupational education in high school (defined as "occupational investors" in chapter I) was not statistically different from the percentage for 1998 graduates (46.2 percent and 43.8 percent, respectively) (figure 11 and table A2).[21]

With declines in general labor market preparation and family and consumer sciences education coursetaking—and relatively steady patterns of occupational coursetaking—occupational

[20]The percentage of graduates earning at least some occupational credits in high school (occupational coursetakers) actually increased slightly from 88.7 percent in 1982 to 92.2 percent in 1992, after which no significant changes were detected. However, the apparent difference between the classes of 1982 and 1998 was not statistically significant.

[21]The percentage of graduates earning 3.0 or more occupational credits in high school (occupational investors) actually declined slightly from 46.2 percent in 1982 to 42.2 percent in 1992, after which no significant changes were detected. However, the apparent difference between the classes of 1982 and 1998 was not statistically significant.

Figure 11. Percentage of public high school graduates participating in occupational education, by different definitions of participation: Various years, 1982–98



[1]Graduates earning greater than 0.0 credits in occupational education.

[2]Graduates earning 3.0 or more credits in occupational education, regardless of whether they concentrate their occupational coursetaking in a single program area.

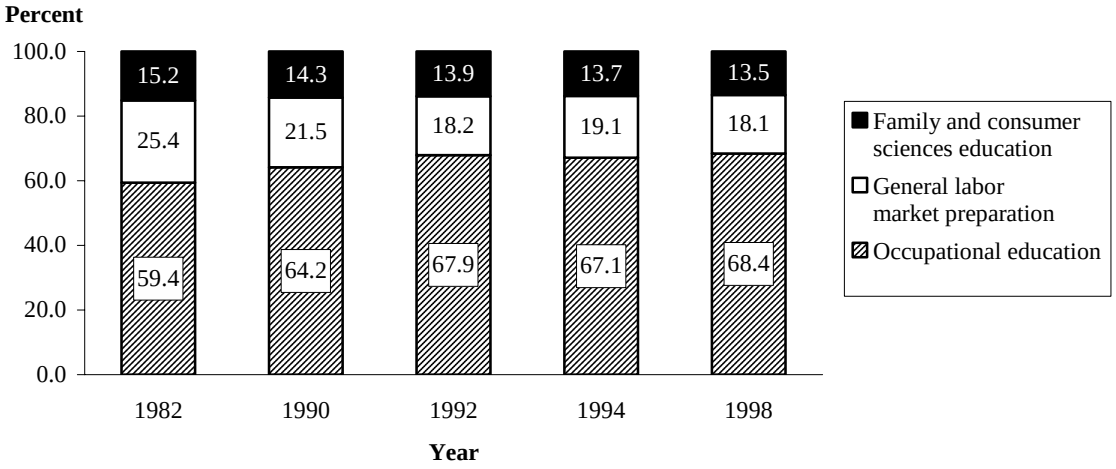
[3]Graduates earning 3.0 or more credits in one of the following 10 broad occupational program areas: agriculture, business, marketing, health care, protective services, technology, trade and industry, food service and hospitality, child care and education, and personal and other services.

[4]Graduates earning 3.0 or more credits in one of the 10 broad occupational program areas, with at least 1.0 advanced credit in that program area. Advanced occupational coursework includes second- or higher-level courses and cooperative education courses.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982; National Education Longitudinal Study of 1988 (NELS:88), Second Follow-up Survey and High School Transcript Study, 1992; and High School Transcript Studies (HSTS), 1990, 1994, and 1998.

education became a more prominent part of high school vocational/technical coursetaking over the period studied. The share of vocational/technical credits earned by public high school graduates that were occupational credits increased from 59.4 percent for 1982 graduates to 68.4 percent (about two-thirds of all vocational/technical coursetaking) for 1998 graduates (figure 12). In comparison, the share of vocational/technical credits earned by graduates that were general labor market preparation credits decreased from 25.4 percent for the class of 1982 to 18.1 percent for the class of 1998. The share of vocational/technical credits earned by 1982 graduates that were family and consumer sciences education credits was not statistically different from the share of these credits earned by 1998 graduates (15.2 percent and 13.5 percent, respectively). The 1998 public high school graduates earned about 2.87 credits in occupational education in high school, in contrast with about 0.61 credits in general labor market preparation and 0.51 credits in family and consumer sciences education (figure 9).

Figure 12. Percentage distribution of vocational/technical credits earned by public high school graduates, by vocational/technical curriculum: Various years, 1982–98



NOTE: Detail may not sum to totals because of rounding. Years are not spaced proportionally.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982; National Education Longitudinal Study of 1988 (NELS:88), Second Follow-up Survey and High School Transcript Study, 1992; and High School Transcript Studies (HSTS), 1990, 1994, and 1998.

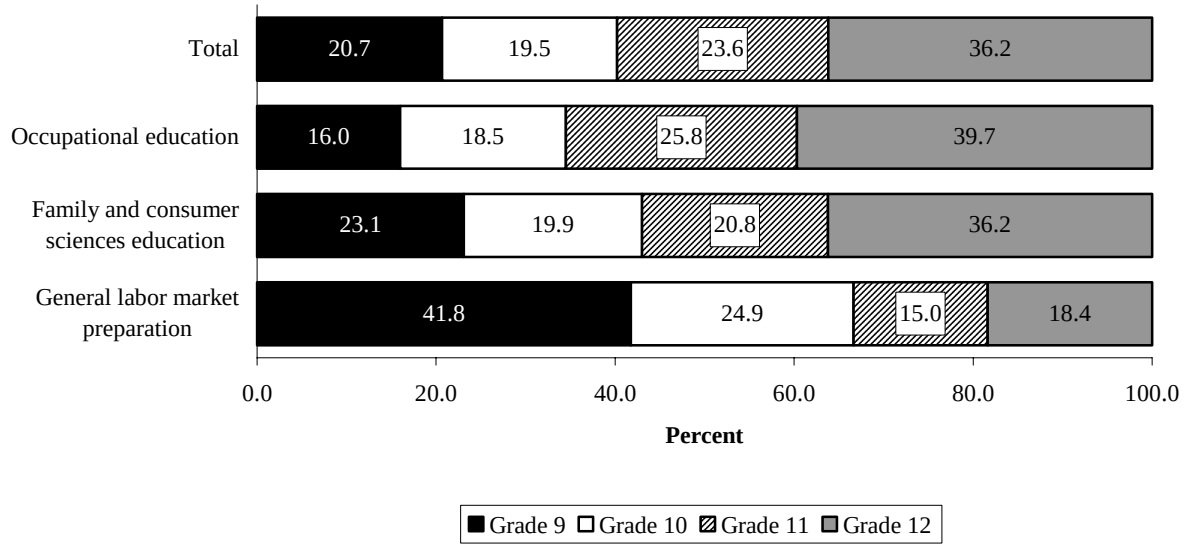
Trends in Vocational/Technical Coursetaking by Grade Level

The Timing of Vocational/Technical Coursetaking

For the high school graduating class of 1998, about 60 percent of vocational/technical coursetaking occurred in the 11th and 12th grades, while about 40 percent occurred in grades 9 and 10 (figure 13 and table A4). Specifically, more than one-third (36.2 percent) of the vocational/technical credits earned by 1998 public high school graduates were earned in grade 12. In comparison, graduates earned 23.6 percent of their vocational/technical credits in grade 11, 19.5 percent in grade 10, and 20.7 percent in grade 9. These proportions translate into 1998 public high school graduates earning 1.51 credits on average—the equivalent of about one and a half full-year vocational/technical courses—in the 12th grade. In contrast, graduates earned 1.01 credits in the 11th grade, 0.75 credits in the 10th grade, and 0.71 credits in the 9th grade (table 2).

For the graduating class of 1998, the timing of occupational and family and consumer sciences education coursetaking was similar to that of overall vocational/technical coursetaking, with more of this coursetaking occurring in grade 12 than in earlier grades. In contrast, general labor market preparation coursetaking was more likely to occur in grade 9. The 1998 public high

Figure 13. Percentage distribution of vocational/technical credits earned by public high school graduates, by grade level of course: 1998



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

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Transcript Study (HSTS), 1998.

Table 2. Average number of vocational/technical credits earned by public high school graduates, by grade level of course: Various years, 1982–98

	1982	1990	1992	1994	1998
Total	4.68	4.19	3.99	3.96	3.99
Grade level					
9	0.71	0.67	0.69	0.68	0.71
10	0.93	0.77	0.76	0.73	0.75
11	1.40	1.13	1.04	1.02	1.01
12	1.62	1.61	1.50	1.53	1.51

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

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982; National Education Longitudinal Study of 1988 (NELS:88), Second Follow-up Survey and High School Transcript Study, 1992; and High School Transcript Studies (HSTS), 1990, 1994, and 1998.

school graduates earned 39.7 percent of their occupational credits and 36.2 percent of their family and consumer sciences education credits in the 12th grade, compared with 18.4 percent of their general labor market preparation credits (figure 13 and table A4). In contrast, graduates earned 41.8 percent of their general labor market preparation credits in the 9th grade, in comparison with 16.0 percent of their occupational credits and 23.1 percent of their family and consumer sciences education credits. For 1998 graduates, 65.5 percent (about two-thirds) of occupational coursetaking and 57.0 percent of family and consumer sciences education coursetaking occurred in the 11th and 12th grades, compared with 33.4 percent of general labor market preparation coursetaking.

The 1998 graduates took more occupational coursework than either family and consumer sciences education or general labor market preparation coursework at each grade level in high school (table 3). For example, in the 9th grade, public high school graduates earned on average 0.38 occupational credits, compared with 0.22 credits in general labor market preparation and 0.11 credits in family and consumer sciences education. In the 12th grade, graduates earned on average 1.19 occupational credits, compared with 0.14 credits in general labor market preparation and 0.18 credits in family and consumer sciences education. The 1.19 occupational credits that 1998 graduates earned in the 12th grade were the equivalent of more than one full-year occupational course.

Table 3. Average number of vocational/technical credits earned by public high school graduates, by grade level of course: 1998

	Vocational/technical total	General labor market preparation	Family and consumer sciences education	Occupational education
Total	3.99	0.61	0.51	2.87
Grade level				
9	0.71	0.22	0.11	0.38
10	0.75	0.14	0.11	0.51
11	1.01	0.11	0.11	0.79
12	1.51	0.14	0.18	1.19

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

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Transcript Study (HSTS), 1998.

Trends in Family and Consumer Sciences Education and General Labor Market Preparation by Grade Level

The average number of credits that public high school graduates earned in family and consumer sciences education declined by 0.18 credits over the period studied, from 0.69 credits for 1982 graduates to 0.51 credits for 1998 graduates (table 4). This decline occurred mainly in the 9th and 11th grades (0.06 credits in each year).

As reported earlier, the average number of credits that public high school graduates earned in general labor market preparation declined by 0.34 credits over the period studied, from 0.95 credits for 1982 graduates to 0.61 credits for 1998 graduates (table 5). Most of this decline occurred in the 10th, 11th, and 12th grades, where the average credits that public high school graduates earned in general labor market preparation declined by 0.15 credits, 0.10 credits, and 0.07 credits, respectively, between 1982 and 1998. There was no significant change detected in the average number of general labor market preparation credits earned in the 9th grade by graduates over this period.

Trends in Occupational Coursetaking by Grade Level

As reported earlier in this chapter, there was no significant difference in the numbers of occupational credits earned on average by 1982 and 1998 public high school graduates.[22] However,

Table 4. Average number of credits earned in family and consumer sciences education by public high school graduates, by grade level of course: Various years, 1982–98

	1982	1990	1992	1994	1998
Total	0.69	0.57	0.54	0.52	0.51
Grade level					
9	0.17	0.13	0.13	0.12	0.11
10	0.13	0.11	0.09	0.11	0.11
11	0.17	0.14	0.11	0.12	0.11
12	0.22	0.19	0.20	0.17	0.18

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

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982; National Education Longitudinal Study of 1988 (NELS:88), Second Follow-up Survey and High School Transcript Study, 1992; and High School Transcript Studies (HSTS), 1990, 1994, and 1998.

[22]Although there were some declines for the graduating classes in interim years, the difference in credits earned on average by 1982 and 1998 graduates was not statistically significant.

Table 5. Average number of credits earned in general labor market preparation by public high school graduates, by grade level of course: Various years, 1982–98

	1982	1990	1992	1994	1998
Total	0.95	0.73	0.62	0.64	0.61
Grade level					
9	0.24	0.21	0.22	0.23	0.22
10	0.29	0.22	0.18	0.17	0.14
11	0.21	0.13	0.10	0.11	0.11
12	0.21	0.17	0.11	0.13	0.14

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

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982; National Education Longitudinal Study of 1988 (NELS:88), Second Follow-up Survey and High School Transcript Study, 1992; and High School Transcript Studies (HSTS), 1990, 1994, and 1998.

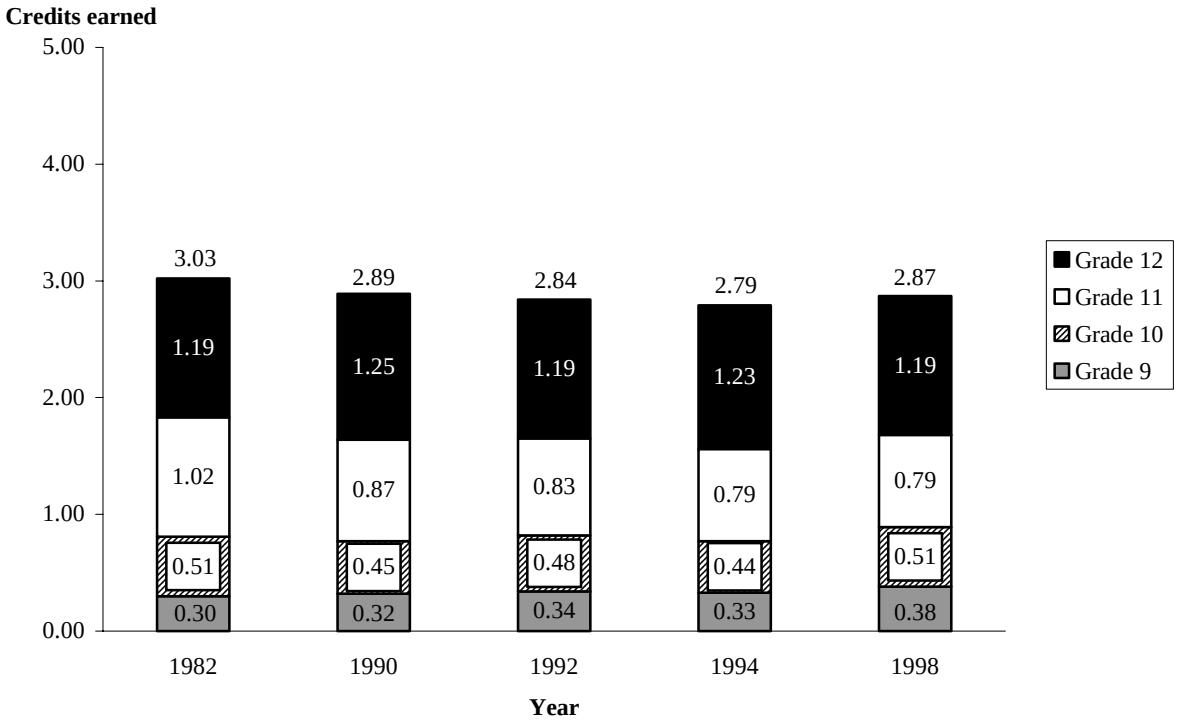
trends in occupational coursetaking varied at the different grade levels over the period studied (figure 14). The 1998 public high school graduates earned on average 0.23 *fewer* occupational credits in the 11th grade and 0.08 *more* occupational credits in the 9th grade than did 1982 graduates. In contrast, there were no statistically significant changes in the average number of occupational credits earned in the 10th and 12th grades by 1982 and 1998 graduates.

Graduates earned more core academic credits in the 11th grade than in any other grade in high school in each year studied. The reduction in occupational coursetaking in the 11th grade may be due to graduates taking additional academic courses over the period in that grade, thereby having less time for occupational coursework. Specifically, 1998 public high school graduates earned 0.84 more credits in core academic subjects (English, mathematics, science, and social studies) in the 11th grade—equivalent to almost one additional full-year core academic course—than did 1982 graduates (table 6).

The decline noted earlier in 9th-grade family and consumer sciences education coursetaking may have made room for some additional occupational coursetaking, making it possible for graduates to shift some of their occupational coursetaking from higher grades (particularly grade 11) to grade 9. Such a shift may have mitigated any overall decline in occupational coursetaking in high school.

As a result of these coursetaking changes in the three vocational/technical subcurricula, the distribution of vocational/technical credits earned across the grade levels shifted somewhat from grade 11 to grade 9. Specifically, comparing 1998 graduates with their 1982 counterparts, the

Figure 14. Average number of occupational credits earned by public high school graduates, by grade level of course: Various years, 1982–98



NOTE: Detail may not sum to totals because of rounding. Years are not spaced proportionally.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982; National Education Longitudinal Study of 1988 (NELS:88), Second Follow-up Survey and High School Transcript Study, 1992; and High School Transcript Studies (HSTS), 1990, 1994, and 1998.

Table 6. Average number of credits earned in core academic subjects by public high school graduates, by grade level of course: Various years, 1982–98

	1982	1990	1992	1994	1998
Total	11.87	13.57	13.88	14.21	14.51
Grade level					
9	3.38	3.59	3.59	3.67	3.73
10	3.15	3.53	3.61	3.70	3.77
11	2.97	3.48	3.59	3.69	3.81
12	2.34	2.97	3.06	3.15	3.21

NOTE: Detail may not sum to totals because of rounding. Core academic subjects include English, mathematics, science, and social studies.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982; National Education Longitudinal Study of 1988 (NELS:88), Second Follow-up Survey and High School Transcript Study, 1992; and High School Transcript Studies (HSTS), 1990, 1994, and 1998.

share of total vocational/technical credits that graduates earned in the 11th grade decreased by 5.1 percentage points over the period, while the share earned in the 9th grade increased by 3.7 percentage points (table A4). (There were no significant changes detected in the shares of vocational/technical credits earned in the 10th and 12th grades.)

Trends in Coursetaking in Occupational Program Areas

As mentioned earlier in the chapter, most public high school graduates in each graduating class studied (between 88.7 percent and 92.2 percent) earned at least some occupational credits in high school (figure 11 and table A2). Similarly, there was no significant difference in the average number of occupational credits earned in high school by 1982 and 1998 graduates (2.87 credits versus 3.03 credits) (figure 9). However, the percentage of public high school graduates who concentrated in occupational education—those who earned 3.0 or more credits in one of the 10 broad occupational program areas in figure 3—declined from 33.7 percent for 1982 graduates to 27.8 percent for 1990 graduates (figure 11 and table A2). As of 1998, 25.0 percent of graduates concentrated in occupational education.[23]

To examine occupational coursetaking in detail, the remainder of this section compares trends in the *breadth* of occupational coursetaking (that is, the percentage of graduates taking at least one course in a program area) and in the *depth* of occupational coursetaking (including both the average credits earned and the percentage of graduates concentrating in a program area) among the 18 narrow program areas in figure 3. Trends in occupational coursetaking varied widely among these program areas.[24] On the one hand, many key measures of participation showed *declines* in coursetaking in materials production (including metals, woods, and plastics), mechanics and repair, business management, and business services. On the other hand, many key measures showed *increases* in coursetaking in computer technology, communications technology, health care, and child care and education. In some of these program areas, both the breadth and depth of coursetaking changed, while in others, patterns were more varied. However, many of the coursetaking measures did not exhibit statistically significant changes between 1982 and 1998. This lack of change could reflect constant rates of coursetaking; however, in some program areas (for example, in personal and other services, construction, and computer technology) small sample sizes may have made it difficult to detect some changes that may have occurred.

[23]The difference in concentration rates for 1990 and 1998 graduates was not statistically significant.

[24]As explained in chapter I, the majority of occupational concentrators earned 3.0 or more credits in one of the 18 narrow occupational program areas in figure 3. However, some concentrators earned 3.0 or more credits in "mixed" business, technology, precision production, and trade and industry program areas without earning 3.0 or more credits in one of the narrow programs within these broad areas. Where appropriate, tables also provide information on concentrators in the four "mixed" program areas.

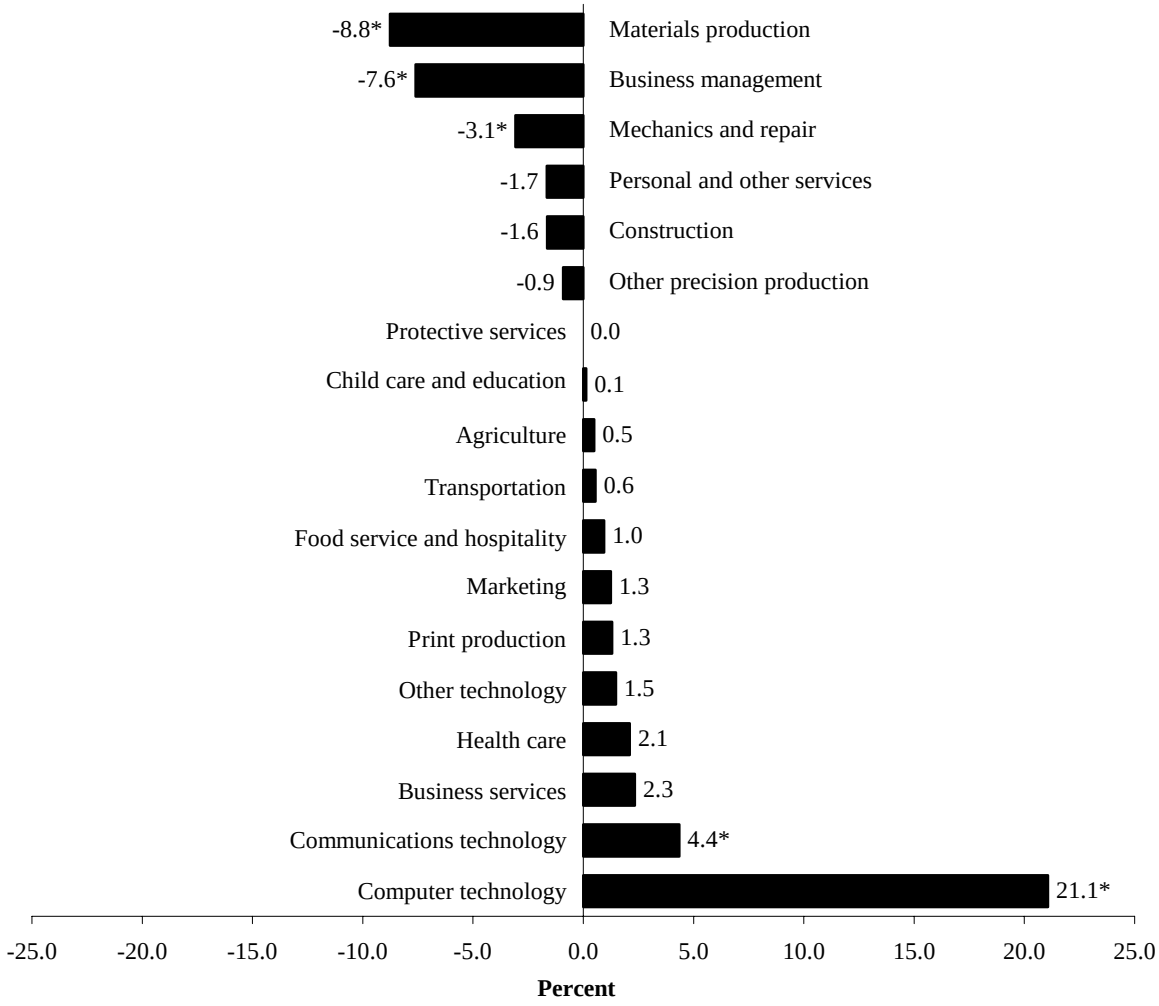
An Overview of Program Areas With Declining Coursetaking

The occupational program areas of materials production, business management, and mechanics and repair exhibited declines in both the breadth and depth of coursetaking over the period studied. Comparing the graduating classes of 1982 and 1998, the percentage of public high school graduates who took at least one course declined over the period in materials production (by 8.8 percentage points), business management (by 7.7 percentage points), and mechanics and repair (by 3.1 percentage points) (figure 15 and table A5). Similarly, the average number of credits earned by public high school graduates declined in these three areas (by 0.17 credits, 0.08 credits, and 0.09 credits, respectively) (figure 16 and table A6). The percentage of graduates who concentrated (earned 3.0 or more credits) in the program area also declined by 1.7 percentage points in materials production and 1.2 percentage points in mechanics and repair (figure 17 and table A7). These declines in both the breadth and depth of coursetaking suggest that these program areas—particularly materials production and mechanics and repair—became a relatively less prominent part of occupational education over the period studied. Declines in some of these program areas appear to reflect changes in occupational employment as well; in particular, between 1983 and 1996, precision production, craft, and repair occupations were projected to have below-average growth (Hurst and Hudson 2000).

Paralleling the trends in vocational/technical education and occupational education noted earlier in this chapter, the business services program area exhibited less change in the breadth of coursetaking than in the depth of that coursetaking. There was no significant difference in the percentage of 1982 and 1998 graduates who earned business services credits, a measure of the breadth of this coursetaking. About 42.0 percent of 1982 graduates and 44.0 percent of 1998 graduates earned business services credits in high school (table A5).[25] In contrast, 1998 graduates earned 0.23 fewer credits on average in business services than did 1982 graduates (figure 16 and table A6), and fewer public high school graduates concentrated in business services over that period (a decline of 6.0 percentage points) (figure 17 and table A7). This indicates that the amount, or depth, of graduates' coursetaking in business services declined between 1982 and 1998. In fact, of the 18 narrow occupational program areas, business services exhibited the largest decline in the percentage of graduates concentrating in the program area over the period studied (figure 17 and table A7).

[25]The percentage of graduates earning business services credits actually increased between 1982 and 1994 and then decreased to a level in 1998 that was not statistically different from that in 1982.

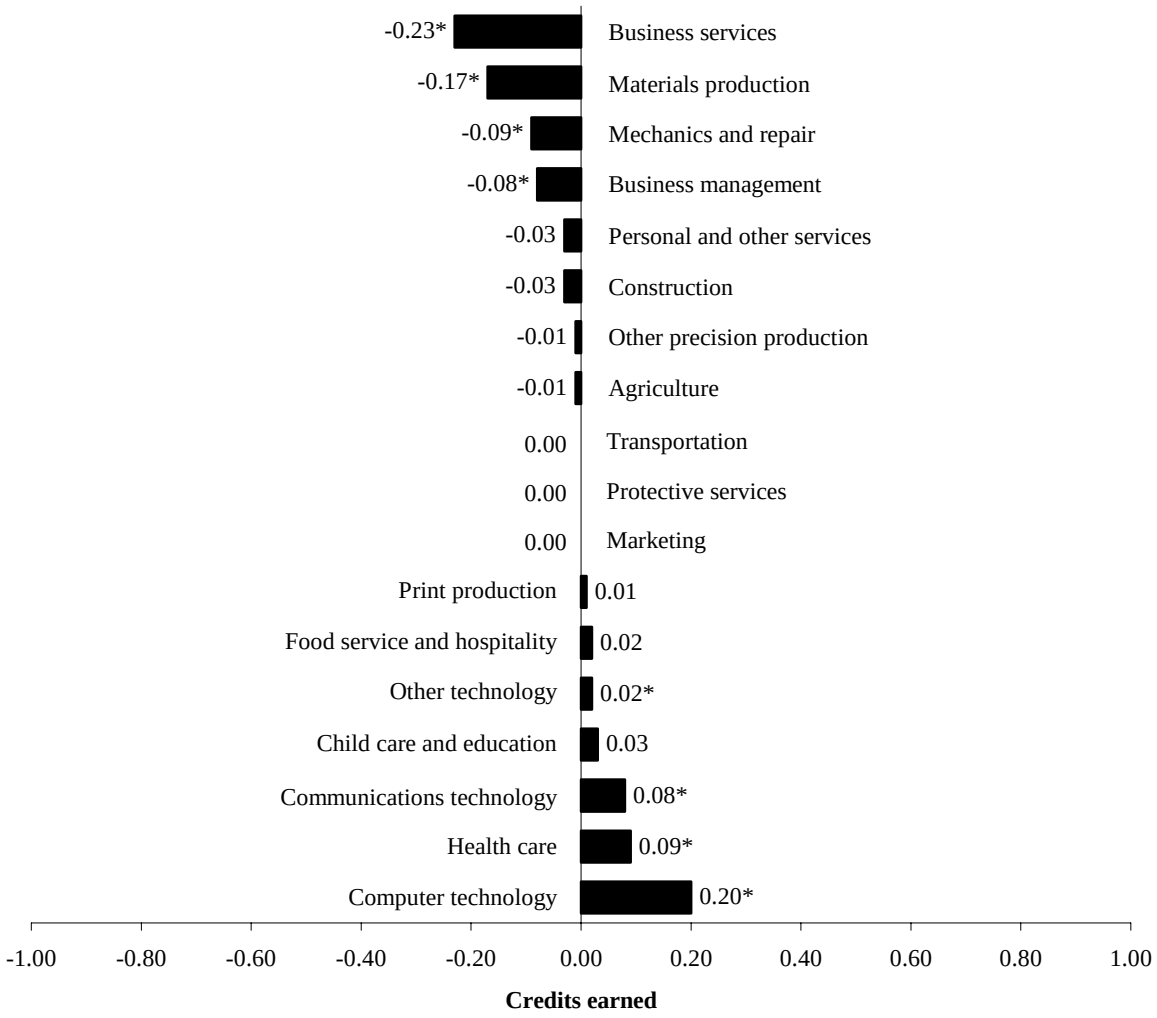
Figure 15. Change in the percentage of public high school graduates taking at least one occupational course, by program area: 1982 and 1998



*These changes between 1982 and 1998 were statistically significant. All other changes in the figure were not statistically significant.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982, and High School Transcript Study (HSTS), 1998.

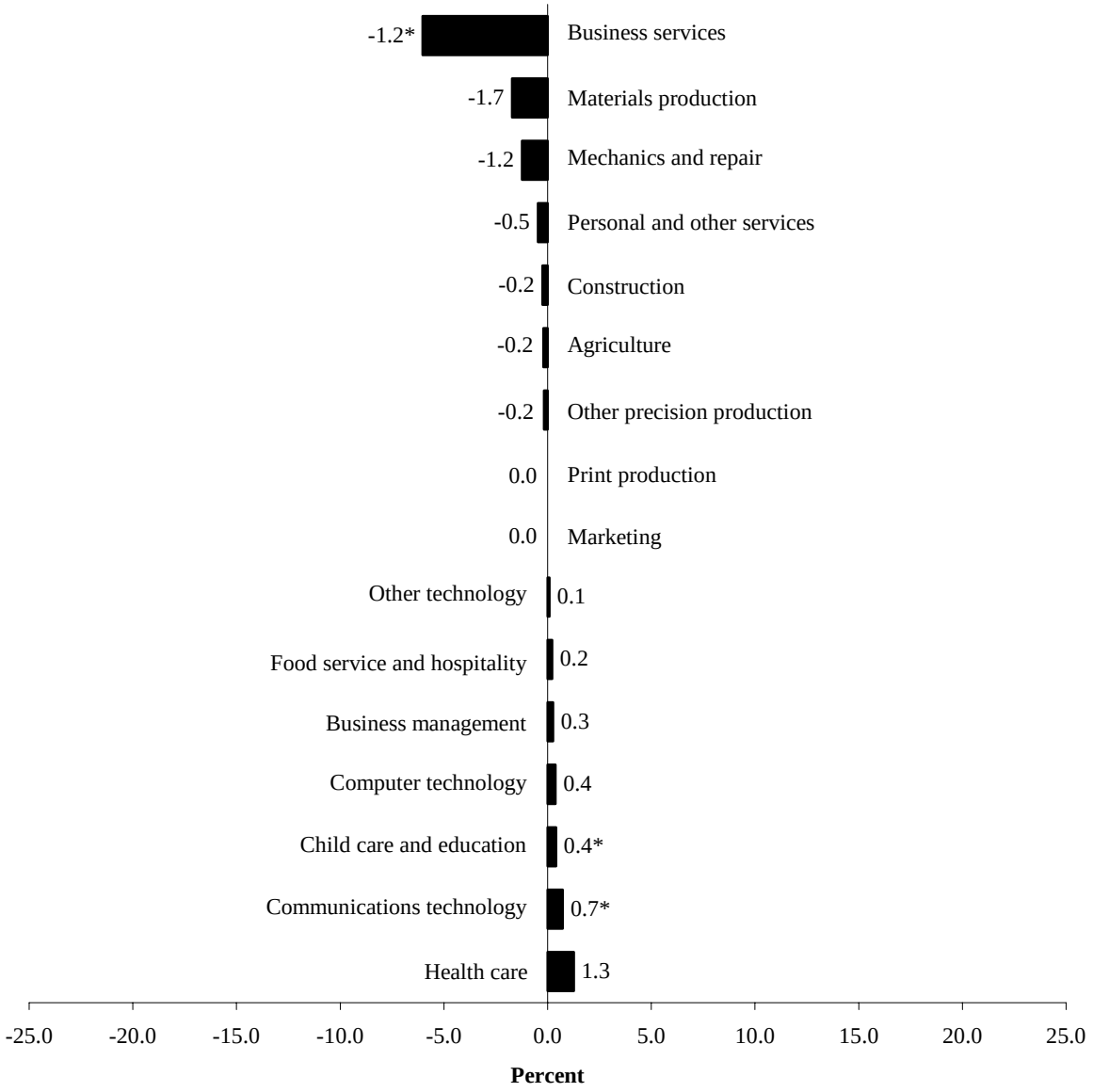
Figure 16. Change in the average number of occupational credits earned by public high school graduates, by program area: 1982 and 1998



*These changes between 1982 and 1998 were statistically significant. All other changes in the figure were not statistically significant.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982, and High School Transcript Study (HSTS), 1998.

Figure 17. Change in the percentage of public high school graduates concentrating in occupational education, by program area: 1982 and 1998



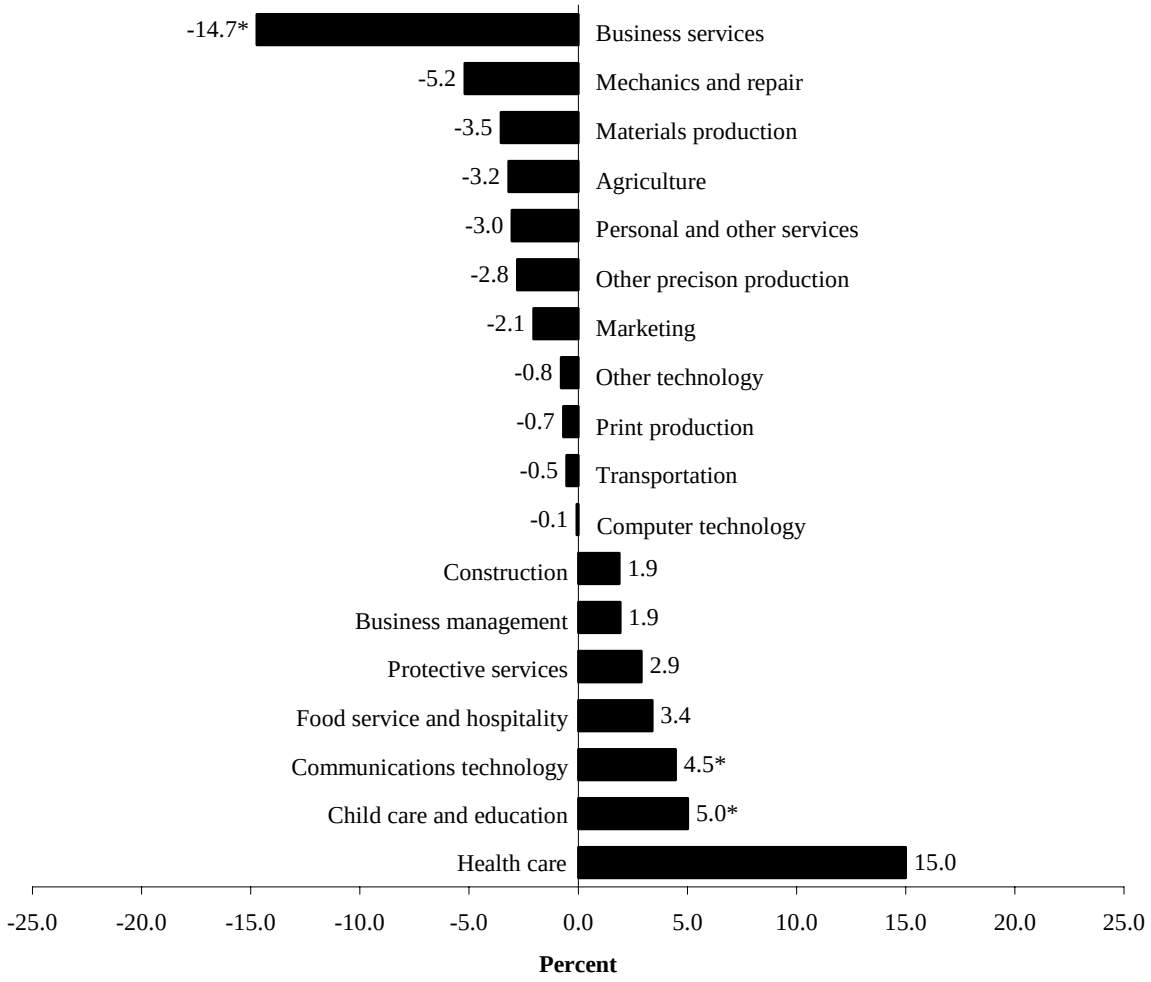
*These changes between 1982 and 1998 were statistically significant. All other changes in the figure were not statistically significant. Health care was not statistically significant due to large standard errors.

NOTE: Details are provided for graduates who concentrated (earned 3.0 or more credits) in the narrow program areas listed. Because percentages for transportation and protective services were too small to report in 1982, the change between 1982 and 1998 could not be calculated for these two program areas.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982, and High School Transcript Study (HSTS), 1998.

Thus, in the business services program area (unlike materials production and mechanics and repair), declines in coursetaking did not result from fewer students taking business services courses in high school, but from business services coursetakers taking less extensive coursework in the program area. Specifically, the proportion of business services coursetakers who concentrated (earned 3.0 or more credits) in the program area in high school declined by 14.7 percentage points between 1982 and 1998 (figure 18 and table A8).

Figure 18. Change in the percentage of occupational coursetakers concentrating in occupational education, by program area: 1982 and 1998



*These changes between 1982 and 1998 were statistically significant. All other changes in the figure were not statistically significant. Health care was not statistically significant due to large standard errors.

NOTE: Occupational coursetakers earned greater than 0.0 credits in occupational education. Details are provided for occupational coursetakers who concentrated (earned 3.0 or more credits) in the narrow program areas listed.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982, and High School Transcript Study (HSTS), 1998.

In addition, declines between 1982 and 1998 in business services coursetaking were due primarily to declines in average credits earned by graduates in *noncomputer-related* business services courses (including bookkeeping, accounting, secretarial, and general office procedures courses) (table 7). In contrast, average credits earned in *computer-related* business services courses increased over the same period. Overall declines in business services coursework coincided with projections of below-average growth for secretary and typist occupations (Hurst and Hudson 2000).

Table 7. Average credits earned in business services by public high school graduates, by computer-related area: Various years, 1982–98

	1982	1990	1992	1994	1998
Total	0.79	0.72	0.65	0.71	0.56
Noncomputer-related	0.78	0.44	0.36	0.33	0.23
Computer-related	0.01	0.28	0.29	0.38	0.33

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

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982; National Education Longitudinal Study of 1988 (NELS:88), Second Follow-up Survey and High School Transcript Study, 1992; and High School Transcript Studies (HSTS), 1990, 1994, and 1998.

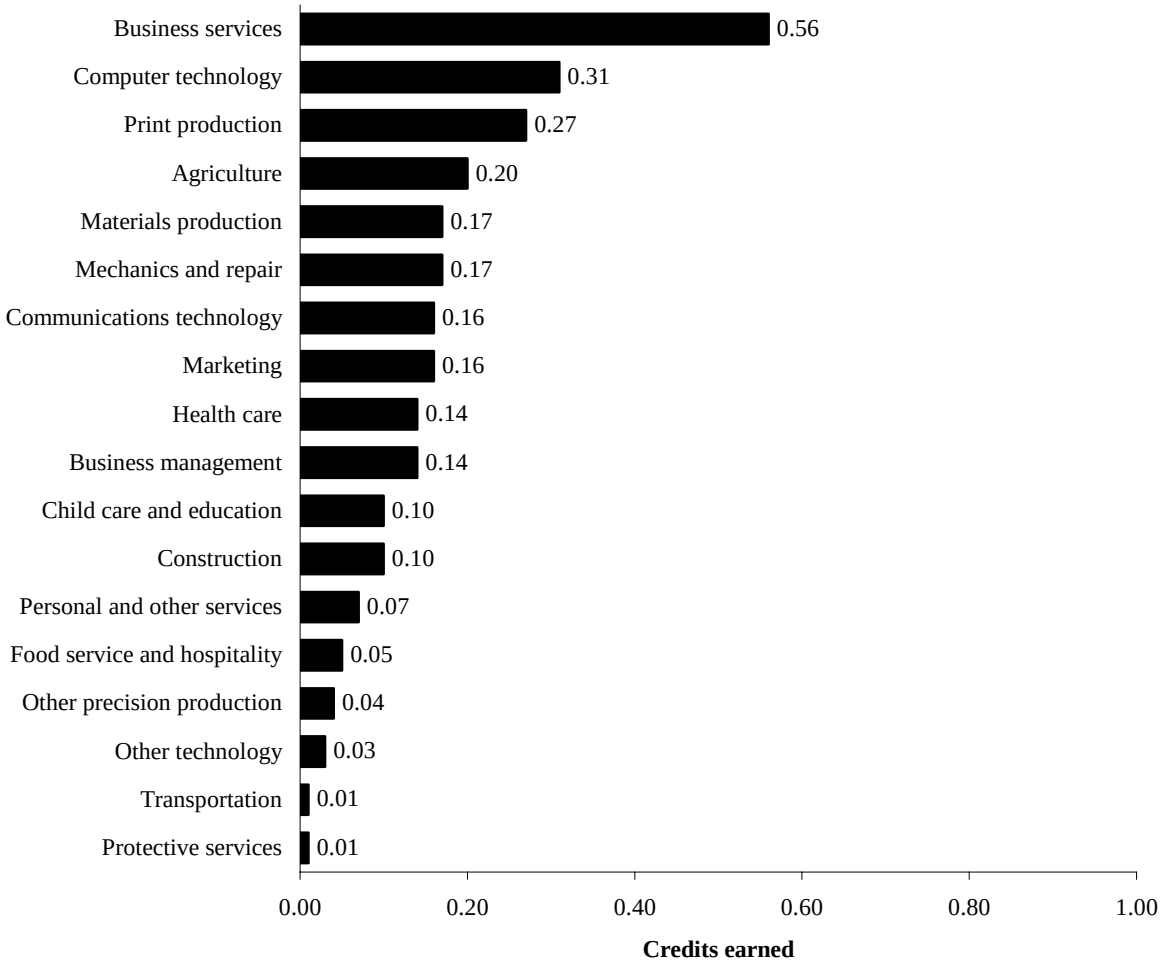
Despite the declines in the amount of business services coursetaking over the period studied, 1998 public high school graduates earned more credits in business services than in any other occupational program area in high school (figure 19 and table A6). Similarly, 1998 graduates were more likely to concentrate in business services than in most other occupational program areas (figure 20 and table A7).[26] Among 1998 graduates, 13.1 percent of all occupational concentrators were in the business services program area (tables 8 and A9).

An Overview of Program Areas With Increasing Coursetaking

The occupational program areas of computer technology and communications technology generally exhibited increases in both the breadth and depth of coursetaking over the period studied. Comparing the classes of 1982 and 1998, the percentage of public high school graduates who earned credits in computer technology increased by 21.1 percentage points, and the percentage who earned credits in communications technology increased by 4.4 percentage points (figure 15 and table A5). Similarly, the average number of credits earned by public high school graduates

[26]The percentage of 1998 graduates concentrating in business services was not statistically higher than the percentage of 1998 graduates concentrating in agriculture, print production, and health care.

Figure 19. Average number of occupational credits earned by public high school graduates, by program area: 1998

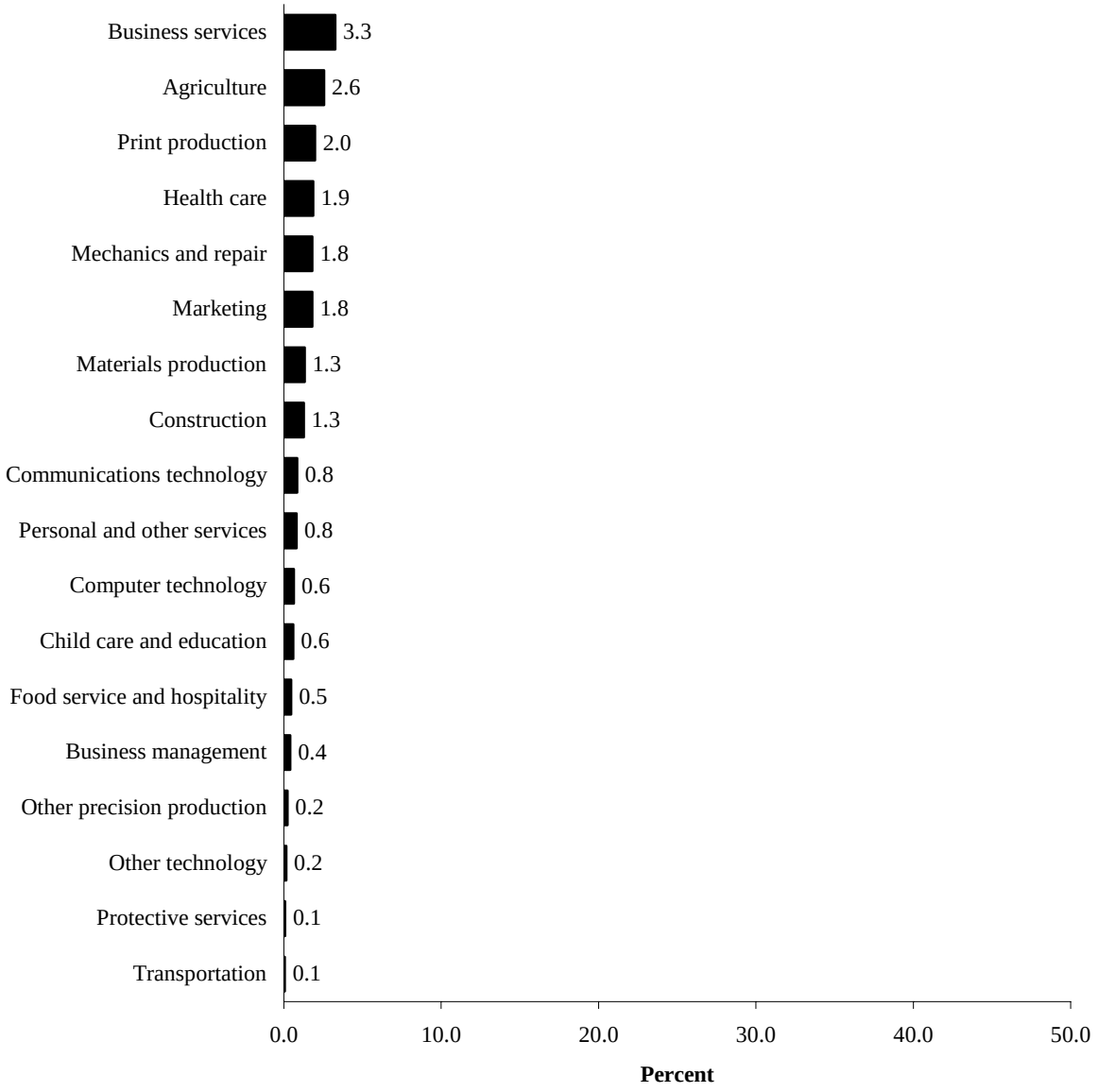


SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Transcript Study (HSTS), 1998.

increased in these two program areas over the period (by 0.20 credits and 0.08 credits, respectively) (figure 16 and table A6).[27] In both cases, increases were greater for computer technology than for communications technology. Finally, the percentage of graduates who concentrated (earned 3.0 or more credits) in communications technology in high school also increased by 0.7 percent (figure 17 and table A7).

[27]The average number of credits earned in the "other technology" area also increased (by 0.02 credits) between 1982 and 1998, although none of the other coursetaking changes discussed in this section was statistically significant in this program area.

Figure 20. Percentage of public high school graduates concentrating in occupational education, by program area: 1998



NOTE: Details are provided for graduates who concentrated (earned 3.0 or more credits) in the narrow program areas listed.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Transcript Study (HSTS), 1998.

Table 8. Percentage distribution of occupational concentrators, by program area: 1998

	1998
Total	100.0
Transportation	0.3
Protective services	0.3
Other technology	0.6
Other precision production	0.9
Business management	1.7
Food service and hospitality	1.8
Child care and education	2.4
Mixed technology[1]	2.4
Computer technology	2.5
Personal and other services	3.2
Communications technology	3.4
Mixed business[1]	4.6
Construction	5.1
Materials production	5.3
Mixed precision production[1]	5.5
Mixed trade and industry[1]	7.0
Marketing	7.2
Mechanics and repair	7.2
Health care	7.4
Print production	7.9
Agriculture	10.2
Business services	13.1

[1]"Mixed" categories include students who earned 3.0 or more credits in one of the broad occupational program areas listed, but fewer than 3.0 credits in any one of the associated sub-areas. That is, students earned 3.0 or more credits in business, but fewer than 3.0 credits in either business management or business services; 3.0 or more credits in technology, but fewer than 3.0 credits in either communications technology, computer technology, or "other" technology; 3.0 or more credits in precision production, but fewer than 3.0 credits in either materials production, print production, or "other" production; or 3.0 or more credits in trade and industry, but fewer than 3.0 credits in either construction, mechanics and repair, transportation, or precision production.

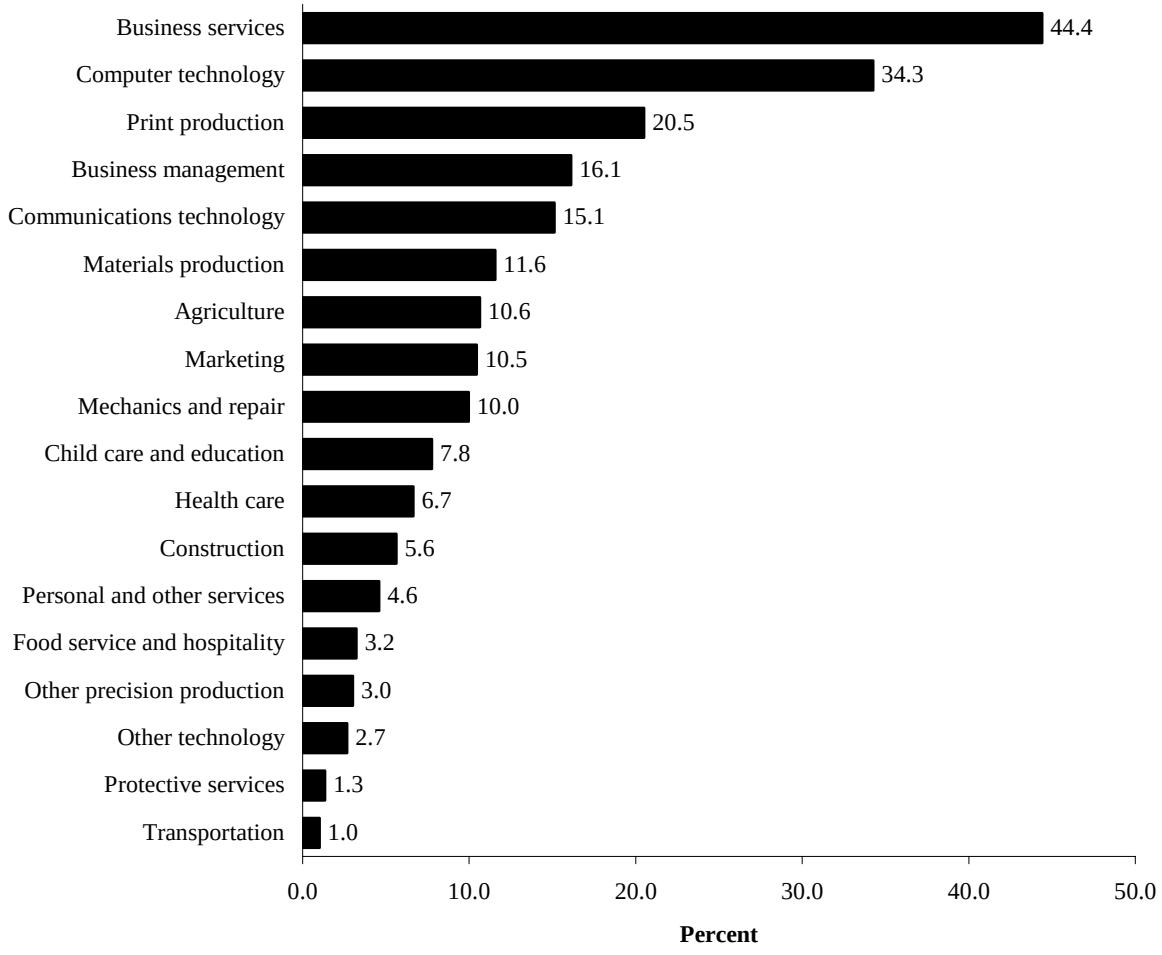
NOTE: Occupational concentrators earned 3.0 or more credits in the occupational program areas listed. In the few cases where graduates earned 3.0 or more credits in more than one program area, they were assigned to the area in which they earned the most credits. Detail may not sum to totals because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Transcript Study (HSTS), 1998.

The increases noted in computer technology coursetaking suggest that this program area became a relatively more prominent part of occupational education over the period studied. About one-third (34.3 percent) of 1998 public high school graduates earned credits in computer technology courses in high school, a higher percentage than that in all other program areas except business services (figure 21 and table A5).[28] Similarly, 1998 graduates earned more credits on average in computer technology than in most other program areas (figure 19 and table

[28]The difference between computer technology and business services was not statistically significant.

Figure 21. Percentage of public high school graduates earning occupational credits, by program area: 1998



SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Transcript Study (HSTS), 1998.

A6).[29] However, the percentage of public high school graduates who concentrated in computer technology in high school was relatively low (figure 20 and table A7).[30] Among 1998 graduates, 2.5 percent of all occupational concentrators were in computer technology (tables 8 and A9).

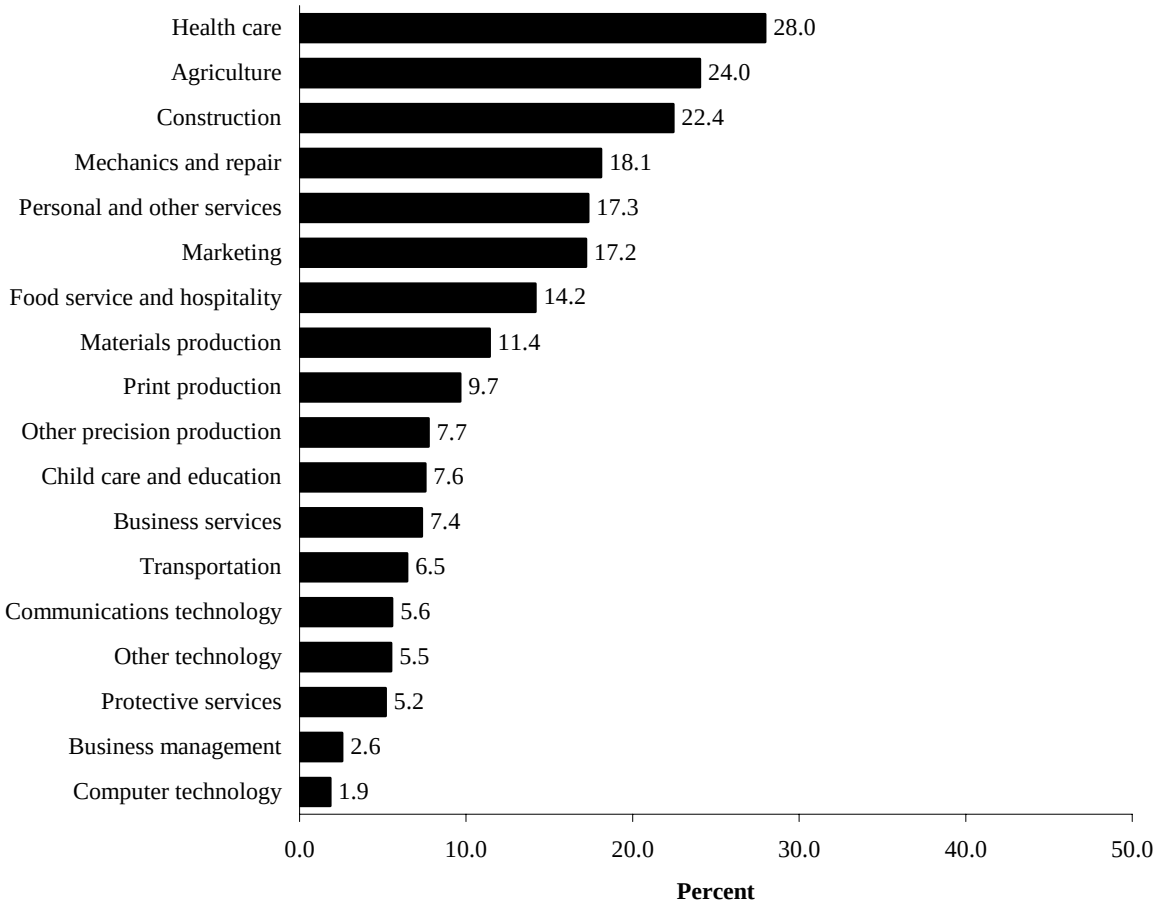
While computer technology coursetaking became more widespread over the period studied, evidence about the depth of that coursetaking was mixed. The average number of credits that

[29]The exceptions were business services, agriculture, and print production. The average number of credits earned by 1998 graduates in agriculture and print production was not statistically different from that earned in computer technology by 1998 graduates. In addition, 1998 graduates earned more credits on average in business services than in computer technology.

[30]Rates of concentrating in a program area were higher in business services (3.3 percent), marketing (1.8 percent), mechanics and repair (1.8 percent), and print production (2.0 percent) than in computer technology (0.6 percent). All other differences between computer technology and other program areas were not statistically significant.

graduates earned in computer technology in high school increased, but the percentage of graduates concentrating in computer technology did not. Among 1998 graduates, 1.9 percent of computer technology coursetakers concentrated in this program area in high school, a lower occupational concentration rate than that for coursetakers in most other program areas (figure 22 and table A8).[31]

Figure 22. Percentage of occupational coursetakers concentrating in occupational education, by program area: 1998



NOTE: Occupational coursetakers earned greater than 0.0 credits in occupational education. Details are provided for occupational coursetakers who concentrated (earned 3.0 or more credits) in the narrow program areas in which they took courses.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Transcript Study (HSTS), 1998.

[31]The percentage of computer technology coursetakers who concentrated in this program area was not statistically different from the percentage of coursetakers concentrating in business management, protective services, other precision production, transportation, and other technology areas.

As with computer technology, the increases in coursetaking noted in communications technology suggest that this program area also became a relatively more prominent part of occupational education over the period studied, although the breadth of communications technology coursetaking was less extensive than that of computer technology. About one in seven 1998 public high school graduates (15.1 percent) earned credits in communications technology, compared with one-third (34.3 percent) in computer technology (figure 21 and table A5).

There is mixed evidence about how communications technology and computer technology compared in terms of the depth of coursetaking. The 1998 public high school graduates earned about half the number of credits on average in communications technology in high school as they did in computer technology (0.16 credits versus 0.31 credits) (figure 19 and table A6). However, the percentage of 1998 graduates who concentrated in communications technology (0.8 percent) was not statistically different from the percentage who concentrated in computer technology (0.6 percent) (figure 20 and table A7). Although fewer 1998 graduates took communications technology courses than computer technology courses in high school, graduates who took communications technology courses were more likely than computer technology coursetakers to concentrate (earn 3.0 or more credits) in their respective program areas. Specifically, among 1998 graduates, 5.6 percent of communications technology coursetakers concentrated in their program area in high school, while 1.9 percent of computer technology coursetakers did so (figure 22 and table A8).

As explained in chapter III, the 1998 Secondary School Taxonomy (SST) classifies computer-related courses according to content rather than pedagogy and includes some courses under the computer technology occupational program area that may have been taught in mathematics or other departments. Consequently, courses classified by the SST under computer technology may not constitute planned sequences of occupational courses to the same extent that courses in other occupational program areas do. It is not possible to determine from the available data to what extent the lower concentration rate among computer technology coursetakers than among communications technology coursetakers may be due to this difference in classification or to other factors.

In addition to increases in coursetaking in the computer and communications technology program areas, both health care and child care and education exhibited some increase in the depth—but not the breadth—of coursetaking over the period studied. The percentage of 1982 public high school graduates earning credits in health care in high school was not statistically different from the percentage of 1998 graduates earning health care credits (4.5 percent and 6.7 percent, respectively) (figure 15 and table A5). Similarly, the percentage of 1982 graduates earning credits in child care and education in high school was not statistically different from the percent-

age of 1998 graduates earning such credits (7.6 percent and 7.8 percent, respectively). In contrast, comparing the classes of 1982 and 1998, the average number of credits earned by graduates increased in health care by 0.09 credits over the period (figure 16 and table A6), equivalent to health care coursetakers taking about one additional health care course over the period. Additionally, the percentage of graduates who concentrated in child care and education in high school increased by 0.4 percentage points (figure 17 and table A7).

To some extent, the increases in occupational coursetaking discussed in this section reflect changes in employment over the period studied. Projected demand for workers in technical and related support occupations, health service occupations, and child care and teacher aide occupations increased at above-average rates between 1983 and 1996 (Hurst and Hudson 2000).

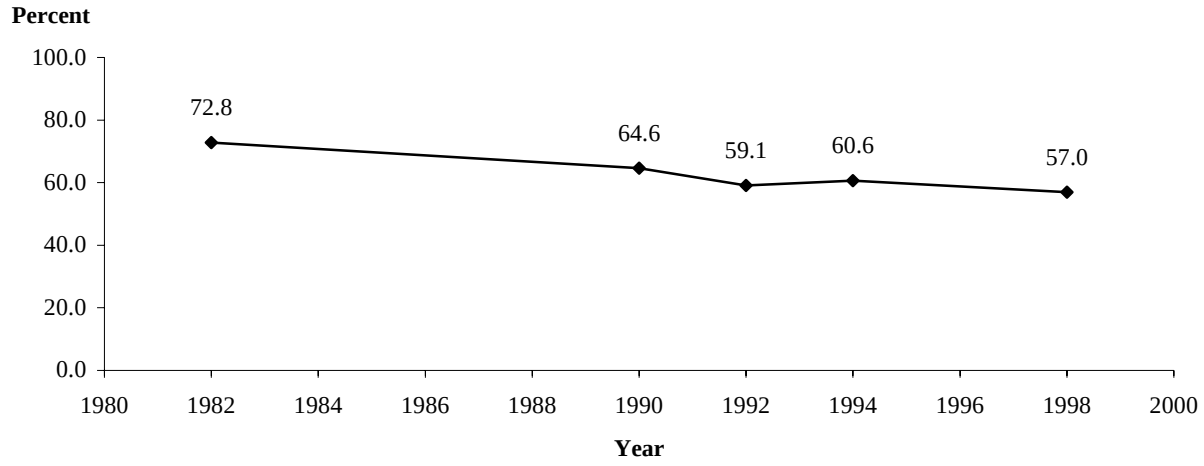
A Closer Look at Trends in Occupational Concentrating

Public high school graduates were less likely to concentrate in occupational education in high school over the period studied. This trend was not due to an overall decline in occupational coursetaking, however. As mentioned earlier, there was no significant difference between the percentage of 1982 public high school graduates taking occupational courses in high school and the percentage of 1998 graduates taking such courses (88.7 percent and 90.7 percent, respectively) (figure 11 and table A2). Similarly, there was no significant difference between the percentages of 1982 and 1998 public high school graduates earning 3.0 or more credits in occupational education in high school (defined as "occupational investors" in chapter I) (46.2 percent and 43.8 percent, respectively). However, the percentage of graduates who concentrated in occupational education—those who earned 3.0 or more credits in one of the 10 broad occupational program areas in figure 3—declined from 33.7 percent for 1982 graduates to 25.0 percent for 1998 graduates. This decline meant that graduates earning 3.0 or more occupational credits were less likely to concentrate that coursetaking in an occupational program area over the period studied. Specifically, the percentage of public high school graduates earning 3.0 or more occupational credits who concentrated in occupational education declined from 72.8 percent for 1982 graduates to 59.1 percent for 1992 graduates. Among 1998 graduates, 57.0 percent of occupational investors concentrated in occupational education (figure 23 and table A10).[32]

Additionally, the percentage of public high school graduates who completed an advanced occupational concentration—occupational concentrators who earned at least 1.0 credit in advanced coursework in their program area—declined from 24.0 percent for 1982 graduates to 16.1 percent for 1990 graduates. For the class of 1998, 14.4 percent of graduates completed an

[32]The difference between 1992 and 1998 graduates in the concentration rates of occupational investors was not statistically significant.

Figure 23. Percentage of public high school graduates earning 3.0 or more occupational credits who concentrated those credits in a single occupational program area: Various years, 1982–98



NOTE: Concentrating in occupational education refers to earning 3.0 or more credits in one of the following 10 broad occupational program areas: agriculture, business, marketing, health care, protective services, technology, trade and industry, food service and hospitality, child care and education, and personal and other services.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982; National Education Longitudinal Study of 1988 (NELS:88), Second Follow-up Survey and High School Transcript Study, 1992; and High School Transcript Studies (HSTS), 1990, 1994, and 1998.

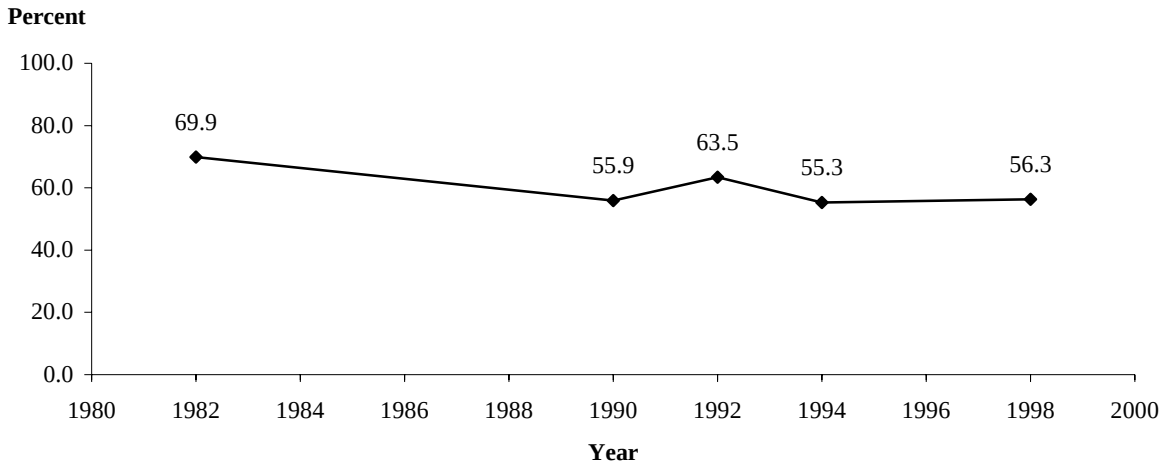
advanced concentration (figure 11 and table A2).[33] Part of this decline in advanced occupational concentrating was due to the fact that graduates were less likely to concentrate in occupational education in general over the period studied. However, the percentage of occupational concentrators who completed an advanced concentration in their program area also declined from 69.9 percent for 1982 graduates to 55.9 percent for 1990 graduates, after which no significant changes were detected.[34] Among 1998 graduates, 56.3 percent of concentrators completed an advanced occupational concentration (figure 24).

What types of occupational courses did these students take instead of completing concentrated or advanced occupational coursework in high school? To answer this question, it is most meaningful to restrict the analysis to occupational investors and concentrators, respectively. The prerequisite for concentrating one's occupational coursework in a single program area is taking at least 3.0 occupational credits. Similarly, the prerequisite for completing an advanced concentration is concentrating in occupational education. Without these restrictions, the analysis of shifting

[33]The difference in advanced concentration rates for 1990 and 1998 graduates was not statistically significant.

[34]Although the percentage of occupational concentrators who completed an advanced concentration increased from 1990 to 1992, neither the 1990 nor 1992 percentage was statistically different from the corresponding 1998 percentage.

Figure 24. Percentage of occupational concentrators completing advanced coursework in their area of concentration: Various years, 1982–98



NOTE: Occupational concentrators earned 3.0 or more credits in one of the following 10 broad occupational program areas: agriculture, business, marketing, health care, protective services, technology, trade and industry, food service and hospitality, child care and education, and personal and other services. Advanced occupational coursework includes second- or higher-level courses and cooperative education courses.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982; National Education Longitudinal Study of 1988 (NELS:88), Second Follow-up Survey and High School Transcript Study, 1992; and High School Transcript Studies (HSTS), 1990, 1994, and 1998.

coursework becomes confounded with general changes in occupational coursetaking over the period studied.

Shifts Away From Concentrated Coursetaking

What types of occupational courses did 1998 graduates who earned 3.0 or more occupational credits (occupational investors) take instead of concentrating this coursetaking in an occupational program area?[35] In order to understand changes in coursetaking patterns in some detail, the report compared trends in coursetaking and concentrating in the 18 narrow program areas in figure 3. Specifically, comparing changes in the percentage distributions of occupational investors who concentrated in occupational education and of the occupational credits that investors earned in the 18 program areas offers some insights into the changing nature of occupational coursetaking over the period studied.

[35]As explained in chapter I, occupational concentrators are a subset of all graduates who earned 3.0 or more occupational credits (occupational investors).

Comparing the classes of 1982 and 1998, the percentage of occupational investors who concentrated in business services declined more steeply than did the share of total occupational credits earned by these investors that were business services credits (a decline of 12.6 percentage points versus 7.9 percentage points) (figure 25 and tables A11 and A12). This pattern means that, over time, occupational investors reduced their concentrating more than they reduced their average coursetaking in business services. In contrast, over the same period, the share of total occupational credits earned by occupational investors that were computer technology and communications technology credits increased more steeply than did the percentage of investors who concentrated in these technology programs (by 6.1 percentage points versus 0.9 percentage points for computer technology and by 3.5 percentage points versus 1.6 percentage points for communications technology) (figure 25 and tables A11 and A12). This pattern means that, over time, occupational investors increased their coursetaking more than they increased their concentrating in these technology programs, particularly in computer technology.[36]

There were no significant differences between the two trend measures in the occupational program areas of mechanics and repair, materials production, health care, and child care and education. The first two programs exhibited declines both in the percentage of occupational investors who concentrated and in the shares of total occupational credits that occupational investors earned in these program areas, while the latter two programs exhibited increases on both measures. In most of the remaining occupational program areas, there were neither significant changes over time in the percentage of occupational investors concentrating nor in the shares of total occupational credits that occupational investors earned in the program areas.[37]

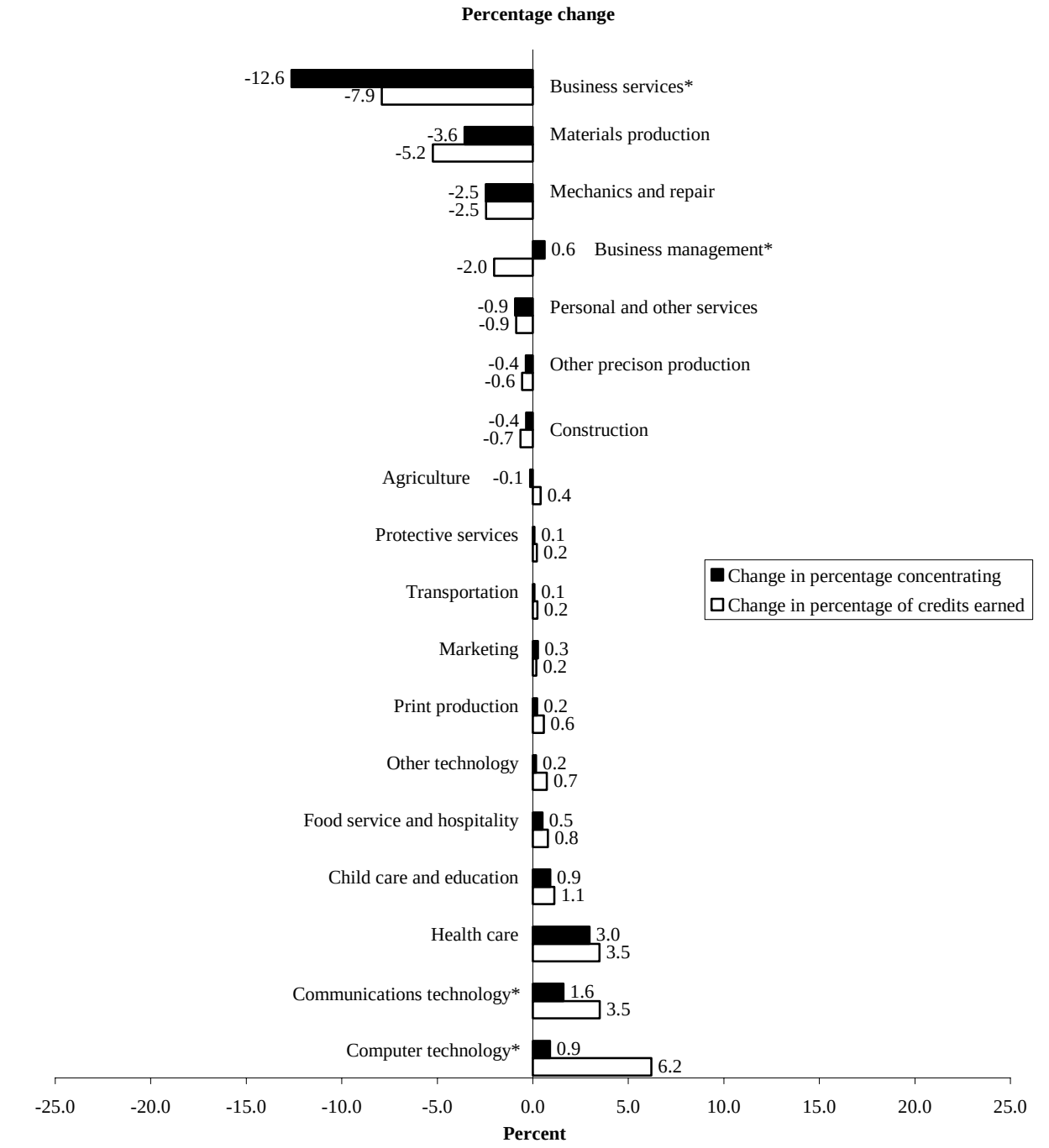
Together, these findings indicate that some of the decline in occupational investors' propensity to concentrate in occupational education was due to a shift from concentrating in business services to taking more communications technology and computer technology courses.[38] That is, occupational investors as a group took fewer business services courses—specifically, fewer noncomputer-related business services courses—in high school over the period studied,

[36]In addition, occupational investors decreased their coursetaking more than they decreased their concentrating in the business management program area. In this case, no significant difference was detected in the percentage of 1982 and 1998 occupational investors who concentrated in business management, while the share of total occupational credits earned by these investors that were business management credits declined significantly over the period.

[37]Program areas not exhibiting significant changes over time on either measure included agriculture, marketing, protective services, construction, print production, other precision production, transportation, food service and hospitality, and personal and other services. Although the share of total occupational credits that occupational investors earned in "other technology" increased significantly for 1998 graduates compared with 1982 graduates, there was no significant difference in the percentage of occupational investors who concentrated in this program area between 1982 and 1998, and there was no significant difference between the two trend measures for the program area.

[38]The discussion of shifting coursetaking in this section refers to changes among occupational investors as a group, not to individual students shifting from one program area to another.

Figure 25. Changes in the percentage distributions of occupational credits earned by occupational investors and of occupational investors concentrating in occupational education, by program area: 1982 and 1998



*The differences between change in percentage concentrating and change in percentage of credits earned for these program areas were statistically significant. All other differences in the figure were not statistically significant.

NOTE: Occupational investors earned 3.0 or more credits in occupational education, regardless of whether they concentrated their occupational coursetaking in a single program area. Details are provided for occupational investors who concentrated (earned 3.0 or more credits) in the narrow program areas listed and for the percentage of occupational credits they earned in those program areas.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982, and High School Transcript Study (HSTS), 1998.

enough to reduce their rate of concentrating in this program area at a relatively high rate. At the same time, they took additional communications technology and computer technology courses—but not enough to increase their rates of concentrating on a par with their increased coursetaking in these program areas.

Chapter III discusses in some detail graduates' computer-related coursetaking. Table 9 shows the three occupational program areas in which students took such coursework in high school. As the table indicates, the credits that occupational investors earned in *noncomputer-related* business services courses (such as bookkeeping, accounting, secretarial, and general office procedures courses) decreased by 0.88 credits on average, from 1.27 credits for 1982 graduates to 0.39 credits for 1998 graduates. At the same time, the credits that these investors earned in *computer-related* business services courses increased by 0.44 credits. The credits that occupational investors earned on average in computer technology and in computer-related drafting/graphics also increased (by 0.27 credits and 0.10 credits, respectively) over the period studied. Thus, the decline in occupational investors' propensity to concentrate in business services coincided with an increase in their total computer-related coursetaking within the occupational education curriculum.

Table 9. Average credits earned in computer-related occupational courses and in business services courses by graduates earning 3.0 or more occupational credits, by program area: Various years, 1982–98

	1982	1990	1992	1994	1998
Computer-related, total	0.16	0.78	0.90	0.83	0.97
Business services[1]	0.02	0.41	0.41	0.51	0.46
Drafting/graphics[1]	‡	0.02	0.03	0.05	0.10
Computer technology	0.14	0.35	0.46	0.28	0.41
Business services, total[1]	1.29	1.19	1.04	1.11	0.85
Computer-related	0.02	0.41	0.41	0.51	0.46
Noncomputer-related	1.27	0.76	0.62	0.60	0.39

‡Reporting standards not met. (Too few cases.)

[1]Only a subset of courses in the business services and drafting/graphics areas were considered to be computer-related. See figure 33.

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

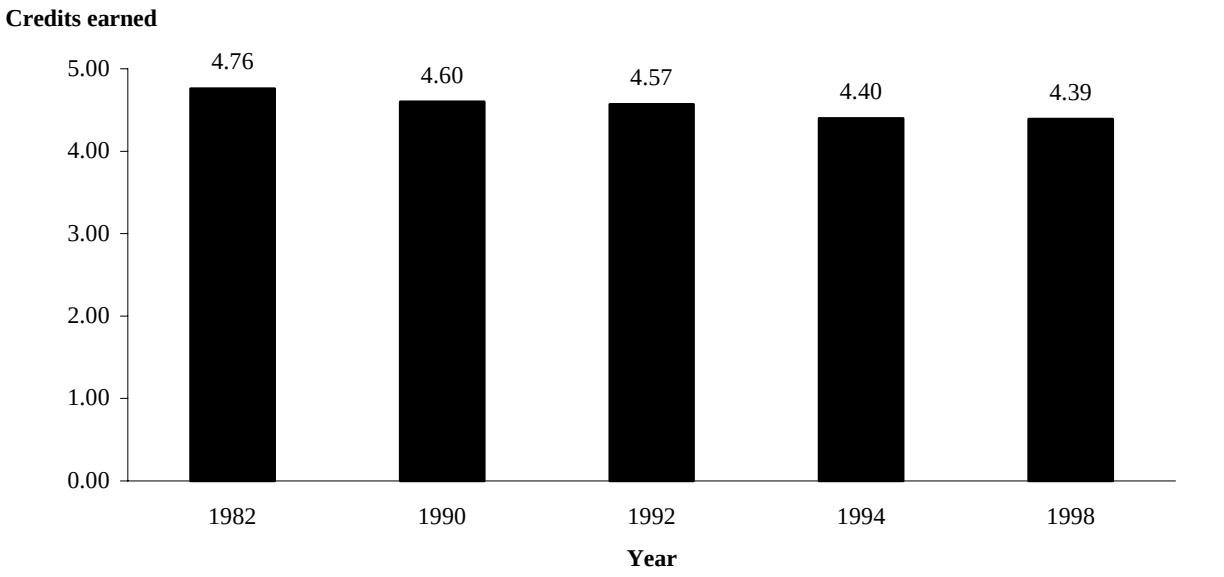
SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982; National Education Longitudinal Study of 1988 (NELS:88), Second Follow-up Survey and High School Transcript Study, 1992; and High School Transcript Studies (HSTS), 1990, 1994, and 1998.

Shifts Away From Completing an Advanced Concentration

What types of occupational courses did 1998 occupational concentrators take instead of completing advanced coursework in their area of concentration? As explained in chapter I, occupational courses are categorized into first-level, second- or higher-level, cooperative education, and specialty courses, with the first three categories usually representing sequential coursetaking. Students may take specialty courses to obtain more specialized occupational training or related skills not taught through sequential courses. For purposes of this analysis, second- or higher-level and cooperative education courses were considered to represent *advanced* coursework in a program area.

Comparing the classes of 1982 and 1998, occupational concentrators—graduates earning 3.0 or more credits in one of the 10 broad occupational program areas in figure 3—earned on average 0.37 fewer credits in their respective areas of concentration by the end of the period (figure 26 and table A13). This decrease was due primarily to a decline in second- or higher-level

Figure 26. Average number of credits earned by occupational concentrators in their area of concentration: Various years, 1982–98



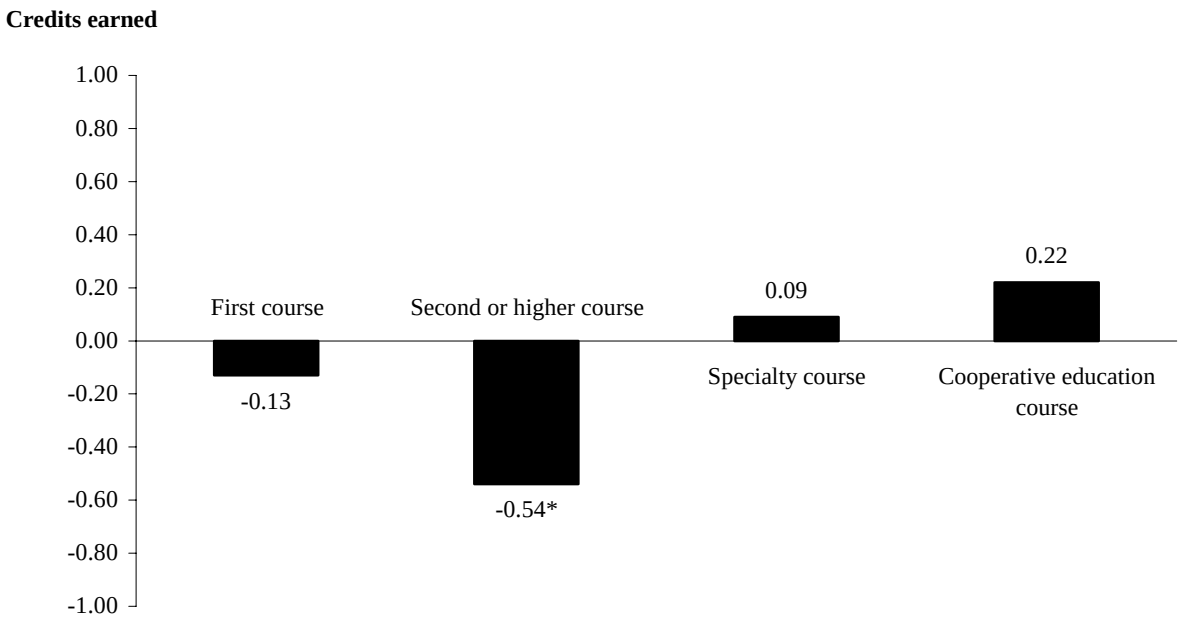
NOTE: Occupational concentrators earned 3.0 or more credits in one of the following 10 broad occupational program areas: agriculture, business, marketing, health care, protective services, technology, trade and industry, food service and hospitality, child care and education, and personal and other services. Years are not spaced proportionally.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982; National Education Longitudinal Study of 1988 (NELS:88), Second Follow-up Survey and High School Transcript Study, 1992; and High School Transcript Studies (HSTS), 1990, 1994, and 1998.

coursetaking. Specifically, 1998 occupational concentrators earned 0.54 fewer credits in second- or higher-level courses in their areas of concentration than did 1982 graduates, equivalent to about one less half-year course (figure 27 and table A13). While credits earned in first-level courses also appeared to decrease and credits earned in cooperative education and in specialty courses appeared to increase, these changes were not statistically significant.

Because of these changes in the types of courses taken, occupational concentrators shifted the distribution of their coursetaking somewhat away from second- or higher-level courses toward specialty courses in their respective areas of concentration over the period studied.[39] Comparing the classes of 1982 and 1998, the share of total credits earned by occupational

Figure 27. Change in the average number of credits earned by occupational concentrators in their area of concentration, by level of course: 1982 and 1998



*This change between 1982 and 1998 was statistically significant. All other changes in the figure were not statistically significant.

NOTE: Occupational concentrators earned 3.0 or more credits in one of the following 10 broad occupational program areas: agriculture, business, marketing, health care, protective services, technology, trade and industry, food service and hospitality, child care and education, and personal and other services.

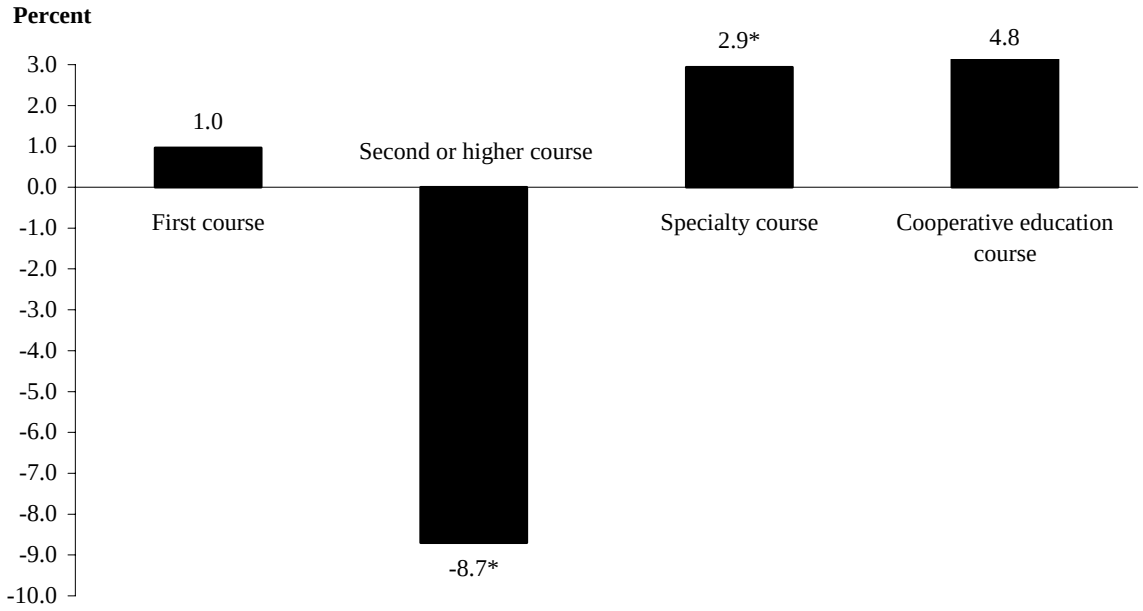
SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982, and High School Transcript Study (HSTS), 1998.

[39]The discussion of shifting coursetaking in this section refers to changes among occupational concentrators as a group, not to individual students shifting from one type of course to another.

concentrators in their areas of concentration that were second- or higher-level credits decreased by 8.7 percentage points (figure 28 and table A14). Over the same period, the share of total credits earned by occupational concentrators in their areas of concentration that were specialty credits increased by 2.9 percentage points. (Again, changes in first-level and cooperative education courses were not statistically significant.)

The decline in 11th-grade occupational coursetaking discussed earlier in the chapter may have affected second- or higher-level occupational coursetaking more than other occupational coursetaking. In some schools, the second course in an occupational sequence occurs in the 11th grade, with first-level courses occurring in the 10th grade and cooperative education courses in the 12th grade.

Figure 28. Change in the percentage distribution of credits earned by occupational concentrators in their area of concentration, by level of course: 1982 and 1998



*This change between 1982 and 1998 was statistically significant. All other changes in the figure were not statistically significant.

NOTE: Occupational concentrators earned 3.0 or more credits in one of the following 10 broad occupational program areas: agriculture, business, marketing, health care, protective services, technology, trade and industry, food service and hospitality, child care and education, and personal and other services.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982, and High School Transcript Study (HSTS), 1998.

Trends in Work-Based Learning

Background and Definitions

Work-based learning is a common component of vocational/technical education in high school. Until recent years, the main forms of work-based learning have been general work experience and cooperative education.[40] General work experience awards school credit for work that is not connected to a specific occupational program. Traditionally, general work experience allowed students who might otherwise drop out of school to earn credit toward graduation for their employment. In other cases, students gain general work or leadership experience or explore career options through work. Typically, however, general work experience is not linked to classroom learning.

In contrast, cooperative education awards school credit for work experience that is related to a student's occupational program. Cooperative education is usually more formal than general work experience. Typically, students are placed in cooperative education jobs rather than find their own employment. The teacher and employer usually sign an agreement covering the nature of the work-based placement, with employers agreeing to evaluate students on their work performance. Typically, cooperative education alternates work placements and classroom time. The degree and nature of the work and classroom linkages involved in cooperative education vary, and it is not possible to determine from transcripts the particular configuration of such a course.

Although other forms of work-based learning exist, this report focuses on trends in general work experience and cooperative education because these types of work-based learning traditionally are awarded school credit and recorded on transcripts.[41]

Trends in Overall Work-Based Learning

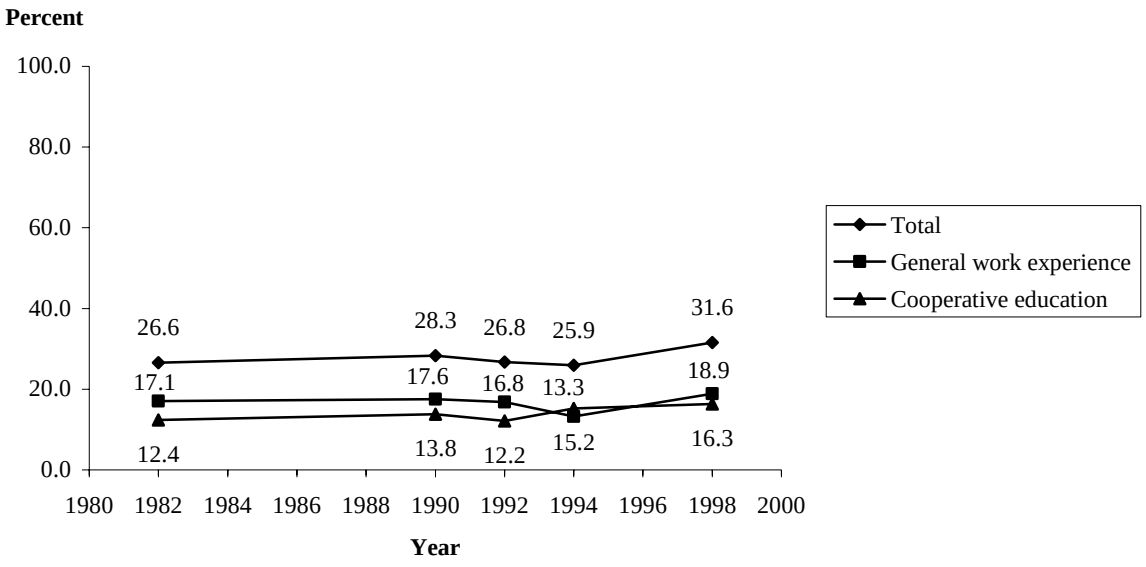
About one-third (31.6 percent) of 1998 public high school graduates took at least some work-based learning courses in high school (figure 29). There was no significant difference in the percentage of graduates taking cooperative education (16.3 percent) and general work experience courses (18.9 percent).[42] On average, 1998 public high school graduates earned 0.53 credits in

[40]Differences between general work experience and cooperative education were discussed by experts during both the creation and revision of the Secondary School Taxonomy (SST) and are reflected in the current SST (Bradby and Hoachlander 1999). See also Westat (1992).

[41]In addition, as of 1997, cooperative education was one of the two most common forms of work-based learning in high schools, along with job shadowing (Levesque et al. 2000).

[42]Percentages sum to greater than the total for work-based learning because some students may have participated in both general work experience and cooperative education courses.

Figure 29. Percentage of public high school graduates taking work-based learning, by type of course: Various years, 1982–98



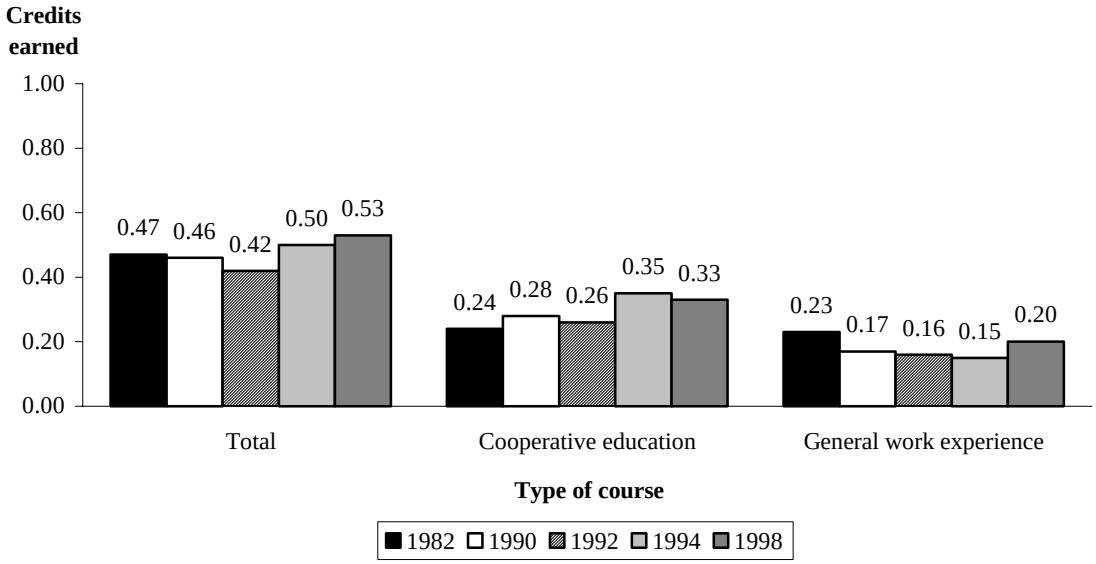
NOTE: Details may sum to greater than the totals because some graduates took both general work experience and cooperative education courses.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982; National Education Longitudinal Study of 1988 (NELS:88), Second Follow-up Survey and High School Transcript Study, 1992; and High School Transcript Studies (HSTS), 1990, 1994, and 1998.

work-based learning courses in high school (figure 30), an amount that was not significantly different from the average number of credits that they earned in family and consumer sciences education (0.51 credits) (figure 9). However, graduates earned more credits on average in cooperative education (0.33 credits) than in general work experience courses (0.20 credits). For the class of 1998, this translates into cooperative education participants taking the equivalent of about two full-year cooperative education courses on average, in comparison with general work experience participants taking the equivalent of about one full-year general work experience course on average.

Over the period studied, participation in work-based learning, overall, remained relatively steady. Although the percentage of public high school graduates taking any work-based learning appeared to increase from 26.6 percent for 1982 graduates to 31.6 percent for 1998 graduates, this difference was not statistically significant (figure 29). Similarly, no difference was detected in the number of credits that 1982 and 1998 graduates earned on average in work-based learning in high school (0.47 credits and 0.53 credits, respectively) (figure 30).

Figure 30. Average number of credits earned in work-based learning by public high school graduates, by type of course: Various years, 1982–98



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

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School and Beyond (HS&B) Sophomore Cohort, First Follow-up Survey and High School Transcript Study, 1982; National Education Longitudinal Study of 1988 (NELS:88), Second Follow-up Survey and High School Transcript Study, 1992; and High School Transcript Studies (HSTS), 1990, 1994, and 1998.

No significant differences between 1982 and 1998 public high school graduates were detected either in the percentage of graduates earning general work experience credits (17.1 percent versus 18.9 percent) (figure 29), or in the average number of credits that graduates earned in general work experience courses (0.23 credits versus 0.20 credits) (figure 30). However, the percentage of public high school graduates taking cooperative education courses increased from 12.4 percent for 1982 graduates to 16.3 percent for 1998 graduates (figure 29). The average number of credits that graduates earned in cooperative education also appeared to increase over the period, but this difference was not statistically significant (figure 30).

Because participation in cooperative education increased while overall occupational coursetaking held steady, cooperative education represented a growing share of all occupational coursetaking over the period studied. Comparing the classes of 1982 and 1998, the percentage of total occupational credits earned by public high school graduates that were cooperative education credits increased slightly from 6.3 percent to 8.5 percent (table A15).

Vocational/Technical Coursetaking and State High School Graduation Requirements

This section examines the relationship between changes in vocational/technical coursetaking and changes in state high school graduation requirements. Because of limitations in the data, the analysis was restricted to changes between 1990 and 1998.[43]

As previously discussed, although vocational/technical coursetaking declined between 1982 and 1998, it remained relatively steady during the 1990s. Specifically, 98.0 percent of 1990 graduates and 96.5 percent of 1998 graduates took at least one vocational/technical course in high school (figure 5 and table A1).[44] There was also no significant difference between 1990 and 1998 graduates in the numbers of credits they earned on average in vocational/technical education in high school (4.19 credits and 3.99 credits, respectively) (figure 6).[45] However, vocational/technical coursetaking may have varied during this decade among the 50 states, possibly associated with changes in state high school graduation requirements. Between 1990 and 1998, 12 states increased their total high school graduation requirements (table 1a), and 10 additional states met the National Commission on Excellence in Education's core academic recommendations advocated in *A Nation at Risk*[46] (table 1b). During the same period, 10 states increased and 8 states decreased their vocational/technical credit requirements for graduation.[47] These different changes in state requirements could have contributed to state-level differences in participation in vocational/technical education during the 1990s.

To examine this issue, this section of the report examines trends in vocational/technical coursetaking among states that did and did not change their high school graduation requirements between 1990 and 1998. Specifically, this section asks: Were increases in total graduation requirements, academic requirements, and other nonvocational/nontechnical requirements associated with decreased vocational/technical coursetaking? Were increases in vocational/technical credit requirements associated with increased vocational/technical coursetaking? Table 10 summarizes state high school graduation requirements and the number of states that exhibited various changes in these requirements between 1990 and 1998. The graduation requirement measures are defined as follows:

[43]It was not possible to link student transcripts to states in the High School and Beyond data set, which provided information on 1982 high school graduates for this report, and national data on state graduation requirements were not available for 1992 and 1994.

[44]The small apparent decline between 1990 and 1998 was not statistically significant.

[45]Although the average number of vocational/technical credits that graduates earned in 1990 appeared to decline by 1992 and then hold steady thereafter, the small apparent declines between 1990 and 1992 and between 1990 and 1998 were not statistically significant.

[46]The Commission's core academic recommendations included 4 years of English and 3 years each of mathematics, science, and social studies. See the National Commission on Excellence in Education (1983).

[47]See Education Commission of the States (1990) and Snyder and Hoffman (2001), table 154.

Table 10. Number of the 50 states with specified changes in state high school graduation requirements between 1990 and 1998

	Number of states
Total	50
Change in vocational/technical requirements[1]	
Increase	10
No change	25
Decrease	8
Not applicable	7
Change in specific nonvocational/technical, nonelective requirements[2]	
Increase	18
No increase (no change or decrease)	25
Not applicable	7
Change in total nonvocational/technical requirements[3]	
Increase	17
No increase (no change or decrease)	26
Not applicable	7
Change in total graduation requirements	
Increase of 2 or more credits	6
Increase of less than 2 credits	6
No increase (no change or decrease)	32
Not applicable	6
Change in New Basics core academic requirements[4]	
Met in 1998 only	11
Met in both years	2
Not met in 1998	30
Not applicable	7

[1]Includes career education (including guidance), practical arts, computer education, free enterprise, vocational education, technology and consumer requirements. Does not include home/personal management or life skills requirements.

[2]Includes all nonvocational/technical requirements except for unspecified elective requirements.

[3]Includes all nonvocational/technical requirements, such as English/language arts, social studies, mathematics, science, physical education/health, fine arts, foreign languages, humanities, oral communication or speech, home/personal management, life skills, and unspecified elective requirements.

[4]Includes 4 years of English and 3 years each of mathematics, science, and social studies.

NOTE: In cases where students could choose how to meet a credit requirement, the requirement was split evenly among the optional subjects. For example, where students could earn 1.0 credit of vocational education and/or fine arts, 0.5 credits were assigned to both subjects for analysis purposes. "Not applicable" means that states allowed local school districts to set their own high school graduation requirements.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Transcript Studies (HSTS), 1990 and 1998.

Vocational/technical requirements—Include credit requirements in career education (including guidance), industrial arts, home economics, practical arts, computer literacy or education, keyboarding, free enterprise, vocational education, technology, and consumer education requirements. When students could choose how to meet a credit requirement, the requirement was split evenly among the optional subjects. For example, when students could earn 1.0 credit of vocational education and/or fine arts, one-half credit was assigned to both subjects for analysis purposes.

Specific nonvocational/nontechnical requirements—Include all nonvocational/nontechnical requirements, *except* unspecified elective requirements. For example, a state may require 2.0 credits of electives, a requirement that could be met by taking vocational/technical or other courses. These unspecified electives are not included; instead, this measure includes all specific nonvocational/nontechnical requirements, such as credit requirements in English, social studies, mathematics, science, physical education/health, fine arts, foreign languages, humanities, oral communication or speech, and life skills requirements.

Total nonvocational/nontechnical requirements—Include all nonvocational/nontechnical requirements, such as credit requirements in English, social studies, mathematics, science, physical education/health, fine arts, foreign languages, humanities, oral communication or speech, life skills requirements, and unspecified electives.

Total graduation requirements—Include all credit requirements for high school graduation.

New Basics core academic requirements—Include 4 years of English and 3 years each of mathematics, science, and social studies.

On the one hand, vocational/technical coursetaking may be expected to increase in states increasing their vocational/technical requirements or, alternatively, decline in states decreasing such requirements. On the other hand, vocational/technical coursetaking may be expected to decrease in states that increased other types of graduation requirements, as defined by the last four measures listed above. In particular, vocational/technical coursetaking may be expected to decrease in states increasing their specific nonvocational/nontechnical requirements and core academic requirements, because increases in these courses might crowd out vocational/technical coursetaking. Factors other than state graduation requirements may also contribute to coursetaking changes.

With several notable exceptions, changes in graduation requirements examined in this report were not related to coursetaking patterns, possibly due to the relatively small number of students in some graduation-requirement categories. However, there was some evidence that, in

states that increased their total graduation requirements and/or their total nonvocational/nontechnical requirements, students decreased their vocational/technical coursetaking. Specifically, graduates in states that increased their total high school graduation requirements by 2.0 or more credits between 1990 and 1998 earned on average 1.00 fewer vocational/technical credits in high school—equivalent to one less full-year vocational/technical course—by the end of the period (table 11). Specifically, graduates in these states earned 0.62 fewer occupational credits and 0.23 fewer family and consumer sciences education credits between the 2 years. Similarly, graduates in states that increased their total high school graduation requirements by 2 or more credits between 1990 and 1998 were less likely by the end of the period to invest 3.0 or more credits in vocational/technical education, invest 3.0 or more credits in occupational education, and concentrate in occupational education (earn 3.0 or more credits in one of the 10 broad occupational program areas in figure 3) (with decreases of 13.8 percentage points, 12.1 percentage points, and 9.6 percentage points, respectively) (table 12). In contrast, students in states that increased their total high school graduation requirements by fewer than 2.0 credits, that did not increase these requirements, or that did not have applicable state requirements did not exhibit statistically significant decreases on any of these vocational/technical coursetaking measures.

In addition, graduates in states that increased their total nonvocational/nontechnical requirements for graduation between 1990 and 1998 earned on average 0.50 fewer vocational/technical credits in high school—equivalent to one less half-year vocational/technical course—by the end of the period (table 11). Graduates in these states were also less likely by the end of the period to invest 3.0 or more credits in vocational/technical education and concentrate in occupational education (earn 3.0 or more credits in one of the 10 broad occupational program areas in figure 3) (with decreases of 7.7 percentage points and 6.5 percentage points, respectively) (table 12).[48]

In contrast, students in states that exhibited no increase (either no change or a decrease) in high school graduation requirements sometimes increased their vocational/technical coursetaking. Specifically, graduates in states that had no increase in their total high school graduation requirements between 1990 and 1998 were more likely by the end of the period to invest 3.0 or more credits in occupational education in high school (an increase of 6.0 percentage points) (table 12). Similarly, graduates in states that had no increase in their total nonvocational/nontechnical requirements between 1990 and 1998 were more likely by the end of the period to invest 3.0 or more credits in occupational education (an increase of 5.5 percentage points).

[48]Although graduates in states that increased their total nonvocational/nontechnical requirements for graduation between 1990 and 1998 also appeared to be less likely over the period to invest 3.0 or more credits in occupational education, this difference was not statistically significant.

Table 11. Average number of vocational/technical credits earned by public high school graduates by vocational/technical curriculum, by change in state high school graduation requirements: 1990 and 1998

	Vocational/technical total			General labor market preparation			Family and consumer sciences education			Occupational education		
	1990	1998	Change	1990	1998	Change	1990	1998	Change	1990	1998	Change
Total	4.19	3.99	-0.20	0.73	0.61	-0.12*	0.57	0.51	-0.06	2.89	2.87	-0.02
Change in vocational/technical requirements[1]												
Increase	4.28	4.27	-0.01	0.72	0.68	-0.04	0.65	0.59	-0.06	2.90	3.00	0.10
No change	3.78	4.07	0.29	0.75	0.68	-0.07	0.70	0.70	‡	2.34	2.69	0.35
Decrease	4.09	3.81	-0.28	0.71	0.59	-0.12*	0.53	0.45	-0.08	2.85	2.78	-0.07
Not applicable	4.55	4.16	-0.39	0.81	0.49	-0.32*	0.55	0.47	-0.08	3.19	3.20	0.01
Change in specific nonvocational/technical, nonelective requirements[2]												
Increase	4.33	4.29	-0.04	0.75	0.62	-0.13*	0.65	0.55	-0.10	2.93	3.12	0.19
No increase	3.99	3.77	-0.22	0.70	0.62	-0.08	0.53	0.49	-0.04	2.77	2.65	-0.12
Not applicable	4.55	4.16	-0.39	0.81	0.49	-0.32*	0.55	0.47	-0.08	3.19	3.20	0.01
Change in total nonvocational/technical requirements[3]												
Increase	4.25	3.75	-0.50*	0.72	0.59	-0.13*	0.57	0.46	-0.11	2.96	2.70	-0.26
No increase	4.03	4.09	0.06	0.72	0.64	-0.08	0.58	0.54	-0.04	2.73	2.90	0.17
Not applicable	4.55	4.16	-0.39	0.81	0.49	-0.32*	0.55	0.47	-0.08	3.19	3.20	0.01
Change in total graduation requirements												
Increase of 2 or more credits	4.06	3.06	-1.00*	0.73	0.59	-0.14	0.47	0.24	-0.23*	2.85	2.23	-0.62*
Increase of less than 2 credits	4.51	4.14	-0.37	0.71	0.51	-0.20*	0.62	0.54	-0.08	3.18	3.09	-0.09
No increase	3.98	4.09	0.11	0.72	0.66	-0.06	0.58	0.56	-0.02	2.68	2.87	0.19
Not applicable	4.55	4.16	-0.39	0.81	0.49	-0.32*	0.55	0.47	-0.08	3.19	3.20	0.01

See notes at end of table.

Table 11. Average number of vocational/technical credits earned by public high school graduates by vocational/technical curriculum, by change in state high school graduation requirements: 1990 and 1998—Continued

	Vocational/technical total			General labor market preparation			Family and consumer sciences education			Occupational education		
	1990	1998	Change	1990	1998	Change	1990	1998	Change	1990	1998	Change
Change in New Basics core academic requirements[4]												
Met in 1998 only	4.68	4.45	-0.23	0.82	0.68	-0.14	0.69	0.55	-0.14	3.17	3.21	0.04
Met in both years	4.42	4.50	0.08	0.90	0.58	-0.32*	0.66	0.55	-0.11	2.86	3.36	0.50
Not met in 1998	3.95	3.76	-0.19	0.67	0.61	-0.06*	0.54	0.50	-0.04	2.74	2.65	-0.09
Not applicable	4.55	4.16	-0.39	0.81	0.49	-0.32*	0.55	0.47	-0.08	3.19	3.20	0.01

‡Reporting standards not met. (Too few cases.)

*These changes were statistically significant; all other changes were not statistically significant.

[1]Includes career education (including guidance), industrial arts, home economics, practical arts, computer literacy or education, keyboarding, free enterprise, vocational education, technology, and consumer education requirements.

[2]Includes all nonvocational/technical requirements except for unspecified elective requirements.

[3]Includes all nonvocational/technical requirements, such as English/language arts, social studies, mathematics, science, physical education/health, fine arts, foreign languages, humanities, oral communication or speech, life skills, and unspecified elective requirements.

[4]Include 4 years of English and 3 years each of mathematics, science, and social studies.

NOTE: In cases where students could choose how to meet a credit requirement, the requirement was split evenly among the optional subjects. For example, where students could earn 1.0 credit of vocational education and/or fine arts, 0.5 credits were assigned to both subjects for analysis purposes. “Not applicable” means that states allowed local school districts to set their own high school graduation requirements. Calculations are based on unrounded numbers.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Transcript Studies (HSTS), 1990 and 1998.

Table 12. Percentage of public high school graduates by different measures of participation in vocational/technical education, by change in state high school graduation requirements: 1990 and 1998

	Occupational concentrators[1]			Occupational investors[2]			Vocational/technical investors[3]		
	1990	1998	Change	1990	1998	Change	1990	1998	Change
Total	27.8	25.0	-2.8*	43.0	43.8	0.9	63.7	61.5	-2.2
Change in vocational/technical requirements[4]									
Increase	28.1	25.0	-3.1	43.6	47.0	3.4	66.1	66.4	0.3
No change	20.6	20.5	-0.1	34.8	41.5	6.7	62.2	65.1	2.8
Decrease	27.8	24.8	-3.1	41.7	41.8	0.1	61.0	58.0	-3.0
Not applicable	29.5	29.6	0.1	49.1	48.7	-0.5	69.7	64.6	-5.1
Change in specific nonvocational/technical, nonelective requirements[5]									
Increase	31.2	29.0	-2.2	44.7	50.1	5.4	66.3	67.4	1.1
No increase	25.1	21.6	-3.5	39.9	39.0	-0.9	60.1	57.3	-2.9
Not applicable	29.5	29.6	0.1	49.1	48.7	-0.5	69.7	64.6	-5.1
Change in total nonvocational/technical requirements[6]									
Increase	30.9	24.4	-6.5*	45.2	40.3	-4.9	65.3	57.6	-7.7*
No increase	24.9	24.4	-0.5	39.3	44.8	5.5*	60.5	63.0	2.5
Not applicable	29.5	29.6	0.1	49.1	48.7	-0.5	69.7	64.6	-5.1
Change in total graduation requirements									
Increase of 2 or more credits	30.3	20.6	-9.6*	44.0	31.8	-12.1*	61.4	47.5	-13.8*
Increase of less than 2 credits	33.8	28.7	-5.1	48.6	46.2	-2.4	69.0	62.3	-6.7
No increase	24.2	24.0	-0.2	38.5	44.6	6.0*	60.1	63.3	3.2
Not applicable	29.5	29.6	0.1	49.1	48.7	-0.5	69.7	64.6	-5.1

See notes at end of table.

Table 12. Percentage of public high school graduates by different measures of participation in vocational/technical education, by change in state high school graduation requirements: 1990 and 1998—Continued

	Occupational concentrators[1]			Occupational investors[2]			Vocational/technical investors[3]		
	1990	1998	Change	1990	1998	Change	1990	1998	Change
Change in New Basics core academic requirements[7]									
Met in 1998 only	35.3	30.4	-4.9	49.5	53.4	3.9	71.3	71.4	0.2
Met in both years	26.1	33.1	7.1	41.4	47.4	6.0	65.9	65.7	-0.2
Not met in 1998	25.5	21.5	-4.0*	39.8	39.5	-0.3	59.9	57.3	-2.7
Not applicable	29.5	29.6	0.1	49.1	48.7	-0.5	69.7	64.6	-5.1

*These changes were statistically significant; all other changes were not statistically significant.

[1]Graduates earning 3.0 or more credits in one of the following 10 broad occupational program areas: agriculture, business, marketing, health care, public and protective services, technology, trade and industry, food service and hospitality, child care and education, and personal and other services.

[2]Graduates earning 3.0 or more credits in occupational education.

[3]Graduates earning 3.0 or more credits in vocational/technical education.

[4]Includes career education (including guidance), industrial arts, home economics, practical arts, computer literacy or education, keyboarding, free enterprise, vocational education, technology, and consumer education requirements.

[5]Includes all nonvocational/technical requirements except for unspecified elective requirements.

[6]Includes all nonvocational/technical requirements, such as English/language arts, social studies, mathematics, science, physical education/health, fine arts, foreign languages, humanities, oral communication or speech, life skills, and unspecified elective requirements.

[7]Includes 4 years of English and 3 years each of mathematics, science, and social studies.

NOTE: In cases where students could choose how to meet a credit requirement, the requirement was split evenly among the optional subjects. For example, where students could earn 1.0 credit of vocational education and/or fine arts, 0.5 credits were assigned to both subjects for analysis purposes. “Not applicable” means that states allowed local school districts to set their own high school graduation requirements. Calculations are based on unrounded numbers.

SOURCE: U.S. Department of Education, National Center for Education Statistics, High School Transcript Studies (HSTS), 1990 and 1998.

While 1998 public high school graduates earned on average fewer general labor market preparation credits than their 1990 counterparts, there were generally no significant declines in the amounts of general labor market preparation coursework that graduates took in states that exhibited no increase (either no change or a decrease) in graduation requirements over the period. Specifically, there were no significant declines in general labor market preparation credits earned by 1990 and 1998 graduates in states that had no increase in their total high school graduation requirements, no increase in total nonvocational/nontechnical requirements, no increase in specific nonvocational/nontechnical requirements, and no change in vocational/technical requirements between 1990 and 1998 (table 11). Generally, declines in general labor market preparation coursetaking were restricted to states with increasing graduation requirements or states that allowed local school districts to set their own high school graduation requirements (termed "not applicable" in table 11).[49]

[49]Exceptions to this general pattern include the following. Graduates in states that met the New Basics core academic requirements in both 1990 and 1998 earned fewer general labor market preparation credits over the period. In addition, graduates in states that increased their vocational/technical requirements between 1990 and 1998, increased their total graduation requirements by 2.0 or more credits over the period, and changed to meet the New Basics core academic standards in 1998 all earned similar numbers of general labor market preparation credits in 1990 and 1998.

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