ies NATIONAL CENTER FOR EDUCATION STATISTICS
Institute of Education Sciences

Statistics in Brief

April 2009

CTE Statistics

New Indicators of High School Career/Technical Education Coursetaking: Class of 2005

U.S. Department of Education
NCES 2009–038

Authors

Lisa Hudson
National Center for Education Statistics

Jennifer Laird
MPR Associates, Inc.

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For more information, contact Lisa Hudson, National Center for Education Statistics, (202) 502-7358, lisa.hudson@ed.gov

Introduction

Career/technical education (CTE) can serve many purposes for high school students, including helping them explore career options, remain engaged in school, gain skills that are broadly useful in the labor market, gain job-specific skills for direct labor market entry, and prepare for further study in postsecondary education. The National Center for Education Statistics (NCES) has examined public high school students' participation in CTE in reports that look at coursetaking from the 1980s through 2005 (Levesque et al. 2008; Levesque 2003; Levesque et al. 2000; Tuma 1996). These reports classify CTE into three curriculum areas: family and consumer sciences education, general labor market preparation, and occupational education, with occupational education being divided into a number of occupational areas (e.g., business services, computer technology, and construction).[1] These reports define occupational concentrators as students who earn at least 3 credits within one occupational area. The most recent of these reports found, for example, that 97 percent of all public high school graduates in 2005 earned credits in CTE, with 21 percent concentrating in an occupational area (Levesque et al. 2008).

This Statistics in Brief examines the CTE coursetaking of 2005 public high school graduates using new indicators of participation. There are a number of reasons for this new look at CTE coursetaking. First, the taxonomy used to categorize CTE was recently updated to better align with current practice (Bradby and Hudson 2007). Although the NCES website includes tabular statistics that use the newly revised taxonomy, this Statistics in Brief is the first NCES report to use it.[2] Second, NCES is working with the National Assessment of Career and Technical Education (mandated by the 2006 Perkins Act [P.L. 109-270, Section 114]) to provide Congress with detailed information on students' CTE coursetaking. Third, CTE experts have recommended developing new coursetaking measures to better capture the many ways in which students currently use the CTE curriculum.[3] This brief thus introduces a variety of new indicators that contrast students' depth and breadth of participation in CTE, in order to elucidate not just the extent of participation in CTE, but also variation in how this curriculum is used.

Using both the newly revised taxonomy and a set of new indicators, this brief presents a more contemporary and detailed picture of CTE coursetaking than is provided by existing indicators. For example, NCES data show that although an increasing percentage of students is enrolling in postsecondary education immediately after high school (Planty et al. 2007), students have maintained a fairly consistent level of participation in occupational education (Levesque et al. 2008). These trends raise concerns that defining "concentration" as earning at least 3 credits in one narrowly defined occupational area may exclude many students who are using the CTE curriculum in a more diversified way. The 2006 Perkins Act (P.L. 109-270), for example, encourages the provision of instruction in "all aspects of an industry," which may lead students to trade depth of coursetaking within an occupational area for a greater breadth of coursetaking across occupational areas (e.g., supplementing auto repair courses with business courses).

[1] Family and consumer sciences education is intended to prepare students for adult roles outside the paid labor market (e.g., home economics, food and nutrition, and consumer education). General labor market preparation provides skills that are generally used across a wide range of occupational areas (e.g., keyboarding, industrial arts, and career exploration). Occupational education provides skills that are used within one occupation or occupational cluster.

[2] These tabular statistics can be found at http://nces.ed.gov/surveys/ctes.

[3] This recommendation was made by the technical review panel that annually provides expert advice for the NCES CTE Statistics program.

Thus, the indicator of occupational concentration used in this brief requires earning at least 2 credits in 1 occupational area, among 11 broadly defined occupational areas—rather than the more restrictive and narrow definition of earning at least 3 credits in 1 of 18 occupational areas, as was used in past analyses (such as Levesque et al. 2008). Unless noted otherwise, all references to "concentration" in this brief refer to the 2-credit, 11-occupational-areas definition.[4]

To better understand how students use the CTE curriculum, this brief examines different patterns of student participation in CTE. First, the brief looks at student participation across the three main CTE curriculum areas (family and consumer sciences education, general labor market preparation, and occupational education), examining the extent to which students take credits across these areas. Second, the brief looks at coursetaking *within* occupational areas, including occupational concentration; these analyses examine the extent to which students participate (earn credits) in the newly defined occupational areas (such as *communications and design*), and the extent to which students participate in each occupational area broadly (many students earning credits) versus deeply (many credits earned by participating students). Finally, the brief examines coursetaking *across* occupational areas, to determine the extent to which students earn credits across multiple occupational areas versus within one occupational area, and which occupational areas students tend to combine.

The brief begins with an overview of the data used to examine participation. This is followed by a presentation of indicators, examining the participation patterns discussed above. Following a short summary, a technical section describes in more detail the data source, the recent taxonomy revision, and analytic procedures.

Data Source and Course Coding

The data used in this brief are from the 2005 High School Transcript Study (HSTS), conducted in conjunction with the 2005 National Assessment of Educational Progress (NAEP). The 2005 HSTS collected school transcripts from a nationally representative sample of more than 29,000 U.S. high school students who completed high school in 2005. The transcripts contain information on the courses students took during high school (grades 9–12) and the credits they earned in those courses.[5] For this brief (as for other CTE statistics reports), the analysis was restricted to public high school students for whom a complete transcript record was available and who earned either a regular or honors high school diploma.[6] This resulted in an analysis sample of about 24,000 public high school graduates.

NCES codes the courses listed on high school transcripts using the Classification of Secondary School Courses (CSSC). More than 2,000 CSSC codes are aggregated into subject areas (mathematics, business services, etc.) using the Secondary School Taxonomy (SST), which was last fully revised in 1998 (Bradby and Hoachlander 1999). The CTE section of the SST was revised in 2007, in response to experts' concerns that the CTE section of the 1998 SST (with categories such as *other technology* and *print production*) had become outdated, in both its terminology and its organizational framework. The 2007 revision updated terminology and improved alignment of the CTE categories with state systems that classify CTE into career clusters, as well as with the NCES postsecondary system for classifying CTE, and the occupational categories used by the U.S. Bureau of Labor Statistics.[7] The findings in this brief use the 2005 HSTS transcript information aggregated into subject areas using the CSSC, and into 11 occupational areas using the 2007 revision of the CTE section of the SST.

Participation Indicators

Coursetaking Across CTE Curriculum Areas

High school graduates from the class of 2005 earned 15 percent of their total credits in CTE, and 66 percent of these CTE credits were in occupational education (calculated from table 1). As seen in table 1, of the average 4.0 CTE credits that graduates earned, 0.4 were in family and consumer sciences education (FCSE), 1.0 in general labor market preparation (GLMP), and 2.6 in occupational education. Although graduates earned more credits in occupational education than in FCSE or GLMP combined, table 2 shows that most graduates (70 percent) earned occupational credits in combination with FCSE and/or GLMP, rather than earning occupational education credits exclusively (17 percent of graduates). About one-quarter (27 percent) earned credits across all three CTE areas.

Over half the graduates (58 percent) also earned credits in more than one occupational area (table 3); among graduates who earned any occupational education credits, about two-thirds (67 percent) earned credits in more than one occupational area (table 3). In addition, 78 percent of occupational concentrators earned credits in more than one occupational area, with 62 percent earning credits in 2 or 3 occupational areas, and 15 percent earning credits in 4 or more occupational areas. Thus, student participation in CTE is broad not only in the sense that most students earn credits in CTE, but also in the sense that most students earn

[4] The reader is cautioned that this (or any other transcript-based) definition of an occupational concentrator is an analytic tool rather than a substantively meaningful grouping. Other definitions could be used; this one was selected because it seems to be a good compromise measure that may identify students who are pursuing a CTE career path, without being overly restrictive in the amount of coursetaking expected within a particular occupational area. In addition, as of 2004–05, the most common state definition of a concentrator for federal accountability purposes included earning 2.0 or more credits in an occupational area (U.S. Department of Education 2008).

[5] Analysts translate the various credits reported on the HSTS transcripts into standard Carnegie units. One Carnegie unit is awarded for a class that meets one period per day for the entire school year, or the equivalent instructional time. For simplicity's sake, the term "credits" is used in this brief in place of "Carnegie units."

[6] The diploma restriction excluded students who completed high school with either a certificate of attendance or general educational development (GED) credential. How high school alternative completers and dropouts use the CTE curriculum is an interesting question, but requires a more complex analysis, as these students complete an abbreviated high school curriculum. Reports that have examined CTE coursetaking among high school dropouts include Plank, DeLuca, and Estacion (2008); Plank (2001); and Rasinski and Pedlow (1995).

[7] See http://www.careerclusters.org/ for a description of the CTE career cluster system advocated for use by states, http://nces.ed.gov/surveys/ctes/tables/postsec_tax.asp for the NCES postsecondary course classification system, and http://www.bls.gov/soc/ for the U.S. Bureau of Labor Statistics occupational categories. Visit http://nces.ed.gov/surveys/ctes/tables/exhibit3 to see how the newly revised taxonomy aligns with career clusters and the NCES postsecondary taxonomy.

credits across multiple parts of the CTE curriculum and across multiple occupational areas within the occupational education curriculum.

Coursetaking Within Occupational Areas

A key measure of occupational coursetaking used in past NCES reports is the average number of credits graduates earn in each occupational area. This measure provides an indicator of the amount of "uptake" or general usage for each occupational area—that is, it summarizes the overall extent to which students participate in each area. Table 4 shows that among the 11 occupational areas, a higher number of average credits was earned in three areas: *business* (.51), *communications and design* (.36), and *manufacturing, repair, and transportation* (.39). However, this summary measure depends on both the breadth of student coursetaking in an occupational area—how many students earn credits in the area—and on the depth of coursetaking in the area—how many credits students earn in the area when they take courses (participate) in that area.

Figure 1 unpacks the summary measure of average credits earned into these separate components of breadth and depth for each occupational area. The occupational areas are listed in the figure based on breadth of participation, from the area with the highest percentage of graduates earning credits in the area to the area with the lowest percentage of graduates earning credits. Five occupational areas had the broadest participation (i.e., had the greatest number of graduates earning credits in the area: *business* (40 percent); *communications and design* (30 percent); *manufacturing, repair, and transportation* (22 percent); *consumer and culinary services* (20 percent); and *computer and information*

Table 1. Percentage of public high school graduates earning credits in a curriculum area, percentage concentrating in career/technical education, and average number of credits earned in an area: Class of 2005

Curriculum area	Percent of graduates earning credits/ concentrating	Average number of credits earned
All curriculum areas	100.0	26.67
Academic	100.0	19.44
Enrichment/other	99.8	3.23
Career/technical education (CTE), total	96.6	4.01
Family and consumer sciences education (FCSE)	41.1	0.40
General labor market preparation (GLMP)	69.1	0.97
Occupational education	86.9	2.63
2-credit definition of concentration	38.8	†
3-credit definition of concentration	21.3	†

† Not applicable.
NOTE: Completing an occupational concentration is defined as earning at least 2.0 credits within an occupational area (2-credit definition) or at least 3.0 credits within an occupational area (3-credit definition).
SOURCE: U.S. Department of Education, National Center for Education Statistics, the 2005 High School Transcript Study (HSTS).

Table 2. Percentage of public high school graduates who earned various combinations of career/technical education (CTE) credits: Class of 2005

Course combination	Percent
Total, any combination of CTE credits	**100.0**
No CTE credits	3.4
Family and consumer sciences education (FCSE) credits only	1.0
General labor market preparation (GLMP) credits only	5.5
Occupational education credits only	16.7
FCSE and GLMP credits only	3.2
Occupational credits in combination with any other CTE credits	70.1
Occupational and FCSE credits only	9.8
Occupational and GLMP credits only	33.3
Credits in all three CTE areas	27.1

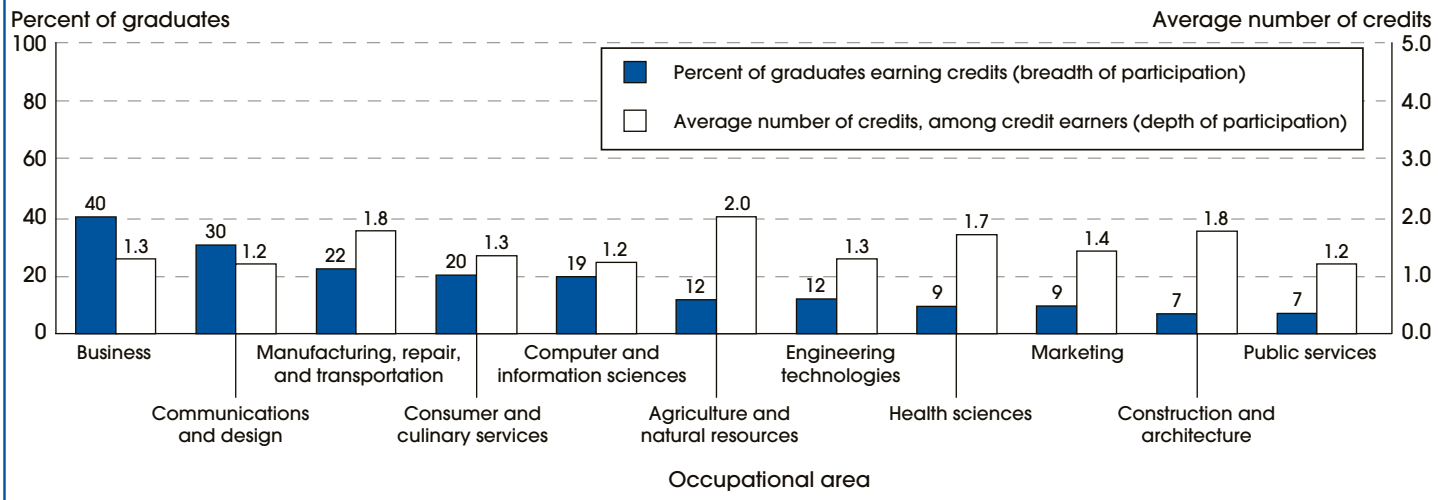
NOTE: Detail may not sum to total due to rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, the 2005 High School Transcript Study (HSTS).

Table 3. Percentage distribution of public high school graduates, graduates who earned any occupational credits, and occupational concentrators, by number of occupational areas in which graduates earned credits: Class of 2005

Number of occupational areas in which graduates earned credits	All graduates	Graduates earning any occupational credits	Occupational concentrators[1]
Total, any number of occupational areas	**100.0**	**100.0**	**100.0**
0 occupational areas	13.1	†	†
1 occupational area	28.9	33.3	22.4
More than one occupational area	58.0	66.7	77.6
2 occupational areas	29.1	33.5	34.7
3 occupational areas	18.7	21.5	27.6
4 occupational areas	7.3	8.4	11.0
5 or more occupational areas	2.8	3.2	4.4

† Not applicable.
[1] Completing an occupational concentration is defined as earning at least 2.0 credits in any one of the following 11 occupational areas: agriculture and natural resources; business; communications and design; computer and information sciences; construction and architecture; consumer and culinary services; engineering technologies; health sciences; manufacturing, repair, and transportation; marketing; and public services.
NOTE: Detail may not sum to totals because of rounding.
SOURCE: U.S. Department of Education, National Center for Education Statistics, the 2005 High School Transcript Study (HSTS).

Figure 1. Percentage of public high school graduates who earned credits in each occupational area and, among those graduates, the average number of credits earned in the area: Class of 2005



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

Table 4. Average number of credits earned by public high school graduates during high school, by occupational area: Class of 2005

Occupational area	Average credits
Agriculture and natural resources	0.23
Business	0.51
Communications and design	0.36
Computer and information sciences	0.24
Construction and architecture	0.12
Consumer and culinary services	0.27
Engineering technologies	0.15
Health sciences	0.16
Manufacturing, repair, and transportation	0.39
Marketing	0.13
Public services	0.08

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

sciences (19 percent)).[8] These occupational areas are similar to those in which students earn the greatest number of credits (table 4), as these two measures are correlated (statistically significant correlation of 0.94).

However, as figure 1 shows, the occupational areas in which graduates participate most broadly do not tend to be the areas in which they participate most deeply (nonsignificant correlation of -0.30). The occupational areas with the deepest levels of participation were *manufacturing, repair, and transportation; agriculture and natural resources; health sciences;* and *construction and architecture*. Graduates who participated in these occupational areas earned an average of 1.7–2.0 credits in their area of participation, significantly higher than the average number of credits earned by graduates who participated in all other occupational areas. Thus, among the five most broadly taken occupational areas listed above, only one—*manufacturing, repair, and transportation*—had a relatively high[9] average number of credits earned among those who participated in the area.

Occupational Concentration

A variation of the depth measure is the concentration measure, which has also been used in past NCES reports (although defined differently, as noted above) (e.g., Levesque et al. 2008). The percentage of graduates who concentrate in an occupational area provides a measure of how many students are earning a minimum number of credits within an occupational area. Thirty-nine percent of all 2005 graduates concentrated their occupational coursetaking, that is, 39 percent earned at least 2 credits in one of the 11 occupational areas (table 5). Among graduates who earned any occupational credits, a higher percentage concentrated in an occupational area (45 versus 39 percent), although the percentage was still less than half. However, a majority of graduates who earned at least 2 occupational credits—69 percent—concentrated their coursetaking.

Within occupational areas, rates of concentration varied from 1 percent of all graduates (in *public services*) to 9 percent (in *business*) (table 5). However, rates of concentration, like average credits earned, depend on the percentage of students who earn credits in an occupational area (i.e., generally speaking, the occupational areas in which more students earn credits tend to be the areas in which more students concentrate (statistically significant correlation of 0.87)). To isolate the depth of coursetaking (as measured by concentration) among students who earn credits within a given occupational area, this section looks at the percentage of students earning credits in each occupational area who also concentrated in that area. In other words, this section answers the question: To what extent do students who participate in a given occupational area also concentrate in that area (earning at least 2 credits in the area)?

[8] There were no measurable differences between the percent earning credits in *consumer and culinary services* and the percent earning credits in *manufacturing, repair, and transportation* or *computer and information sciences*.

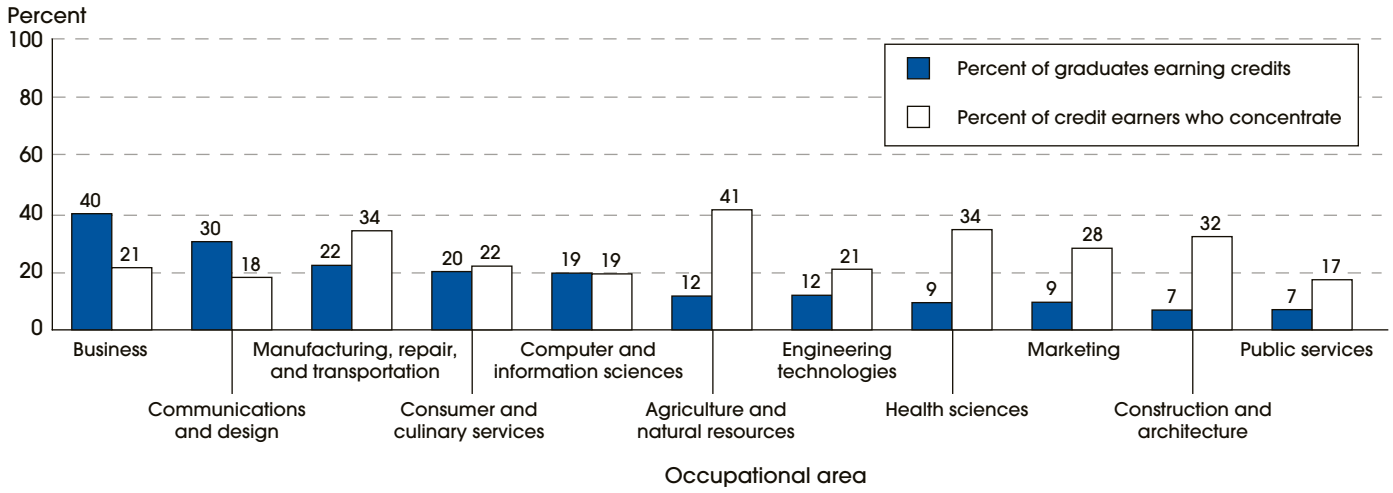
[9] As used in this brief, "relatively high" means that an occupational area is among a set of occupational areas for which participation was high relative to participation in the remaining occupational areas (i.e. participation in the given set of areas was measurably higher than participation in all remaining areas). "Relatively broad" and "relatively deep" are similarly defined.

Table 5. Percentage of public high school graduates who concentrated in each occupational area, overall and among graduates who earned various numbers of occupational credits: Class of 2005

Occupational area of concentration	Percent of each group who were occupational concentrators		
	All graduates	Graduates who earned any occupational credits	Graduates who earned 2.0 or more occupational credits
Any occupational area	38.8	44.7	68.6
Agriculture and natural resources	4.7	5.5	8.4
Business	8.5	9.7	15.0
Communications and design	5.4	6.2	9.5
Computer and information sciences	3.7	4.3	6.5
Construction and architecture	2.1	2.5	3.8
Consumer and culinary services	4.4	5.0	7.7
Engineering technologies	2.4	2.8	4.3
Health sciences	3.2	3.7	5.7
Manufacturing, repair, and transportation	7.5	8.6	13.3
Marketing	2.6	3.1	4.7
Public services	1.2	1.4	2.1

NOTE: Completing an occupational concentration is defined as earning at least 2.0 credits in one of the 11 occupational program areas listed in the table.
SOURCE: U.S. Department of Education, National Center for Education Statistics, the 2005 High School Transcript Study (HSTS).

Figure 2. Percentage of public high school graduates who earned credits in each occupational area and, among those graduates, the percentage who concentrated in the area: Class of 2005



NOTE: Completing an occupational concentration is defined as earning at least 2.0 credits in one of the occupational areas listed in this figure.
SOURCE: U.S. Department of Education, National Center for Education Statistics, the 2005 High School Transcript Study (HSTS).

Figure 2 compares the percentage of graduates who earned credits in each occupational area with the percentage of those earners who concentrated in the area, ordered by the percentage of graduates who earned credits in the area. As evident in the figure, the occupational areas in which students were most likely to earn credits (*business; communications and design; manufacturing, repair, and transportation*) were not necessarily the areas in which participating students were most likely to concentrate (nonsignificant correlation of -0.22). Students who earned credits in *manufacturing, repair, and transportation; agriculture and natural resources; health sciences;* and *construction and architecture* generally had the highest rates of concentration (32 to 41 percent).[10] Only one of these occupational areas—*manufacturing, repair, and transportation*—was an area in which a relatively high percentage of students earned credits (22 percent).

Concentrators (students who earned at least 2 credits in an occupational area) also frequently earned credits in other occupational areas. Table 6 shows that most of the students who concentrated in an occupational area took courses in other occupational areas; the percentage who did so ranged from 74 percent for concentrators in *communications and design* to 90 percent for concentrators in *construction and architecture* and in *engineering technologies*.

Coursetaking Across Occupational Areas

As discussed above, coursetaking across occupational areas is common: Most students (58 percent) earn credits in more than one occupational area, and most students who concentrate in an area (78 percent) also earn credits in other occupational areas (tables 3 and 6). Figures 3 and 4 provide

[10] There was one exception: No measurable difference was found between the rates at which participants in *construction and architecture* concentrated in *construction and architecture* and the rate at which *marketing* participants concentrated in *marketing*.

Table 6. Percentage of public high school graduates concentrating in each occupational area who earned credits in other occupational areas: Class of 2005

Occupational area of concentration	Percent earning credits in other occupational areas
Agriculture and natural resources	84.0
Business	78.3
Communications and design	74.0
Computer and information sciences	81.4
Construction and architecture	90.2
Consumer and culinary services	77.4
Engineering technologies	89.5
Health sciences	79.4
Manufacturing, repair, and transportation	82.2
Marketing	87.4
Public services	82.0

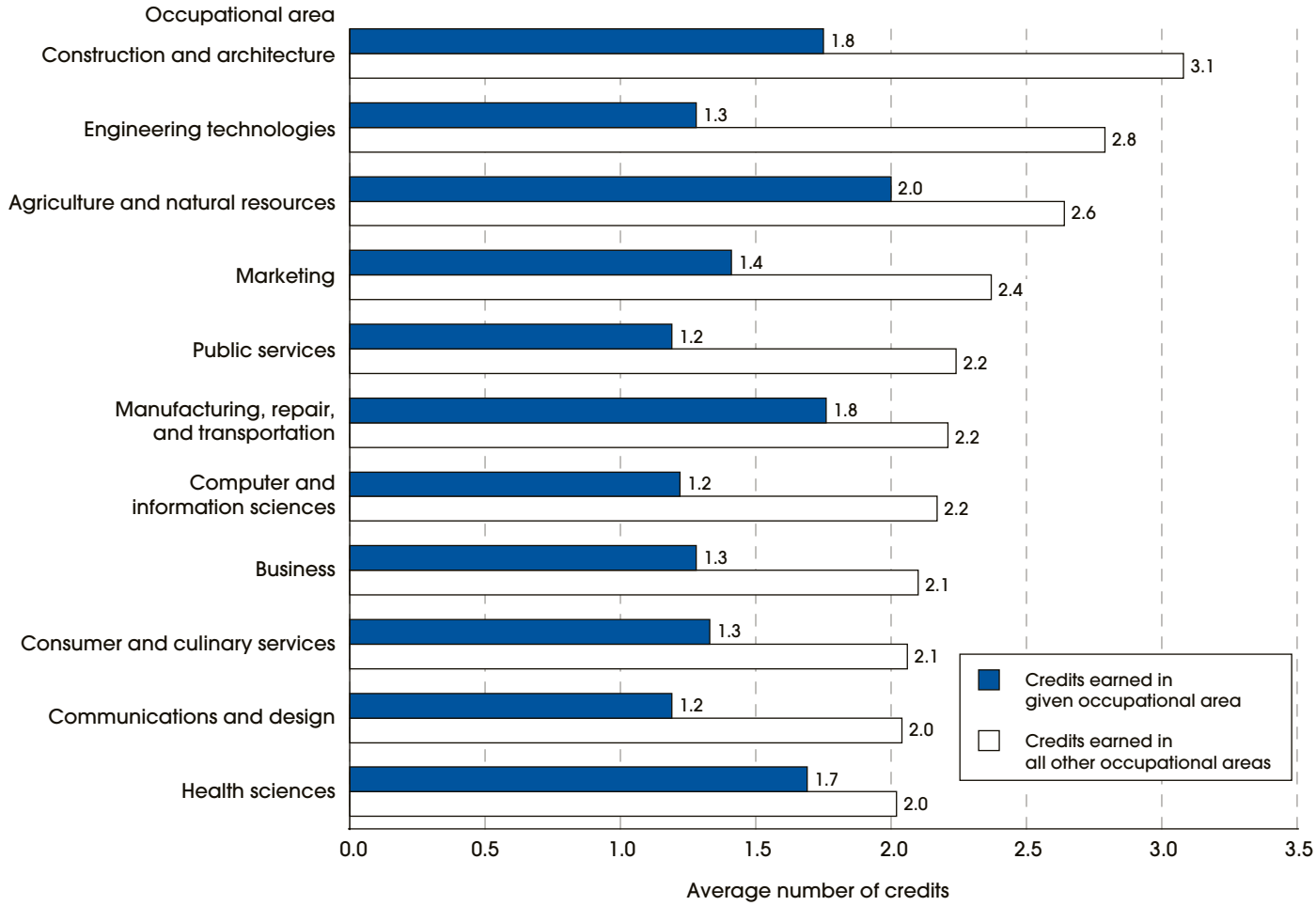
NOTE: Completing an occupational concentration is defined as earning at least 2.0 credits in one of the 11 occupational areas listed in the table.
SOURCE: U.S. Department of Education, National Center for Education Statistics, the 2005 High School Transcript Study (HSTS).

additional indicators of the breadth of student coursetaking across occupational areas. Figure 3 shows, for graduates who earned credits in each occupational area, the average number of credits earned in that occupational area and the average number of credits earned in all other occupational areas. Figure 4 combines the data from figure 3 to show, for graduates who earned credits in each occupational area, the percentage of occupational credits that were earned in all other occupational areas.

As seen in these figures, graduates who participated (earned credits) in each of the 11 occupational areas earned more credits in all other occupational areas (combined) than they did in the given occupational area. For example, graduates who earned credits in *health sciences* earned 55 percent of their occupational credits in other areas; graduates who earned credits in *engineering technologies* earned 69 percent of their occupational credits in other areas.

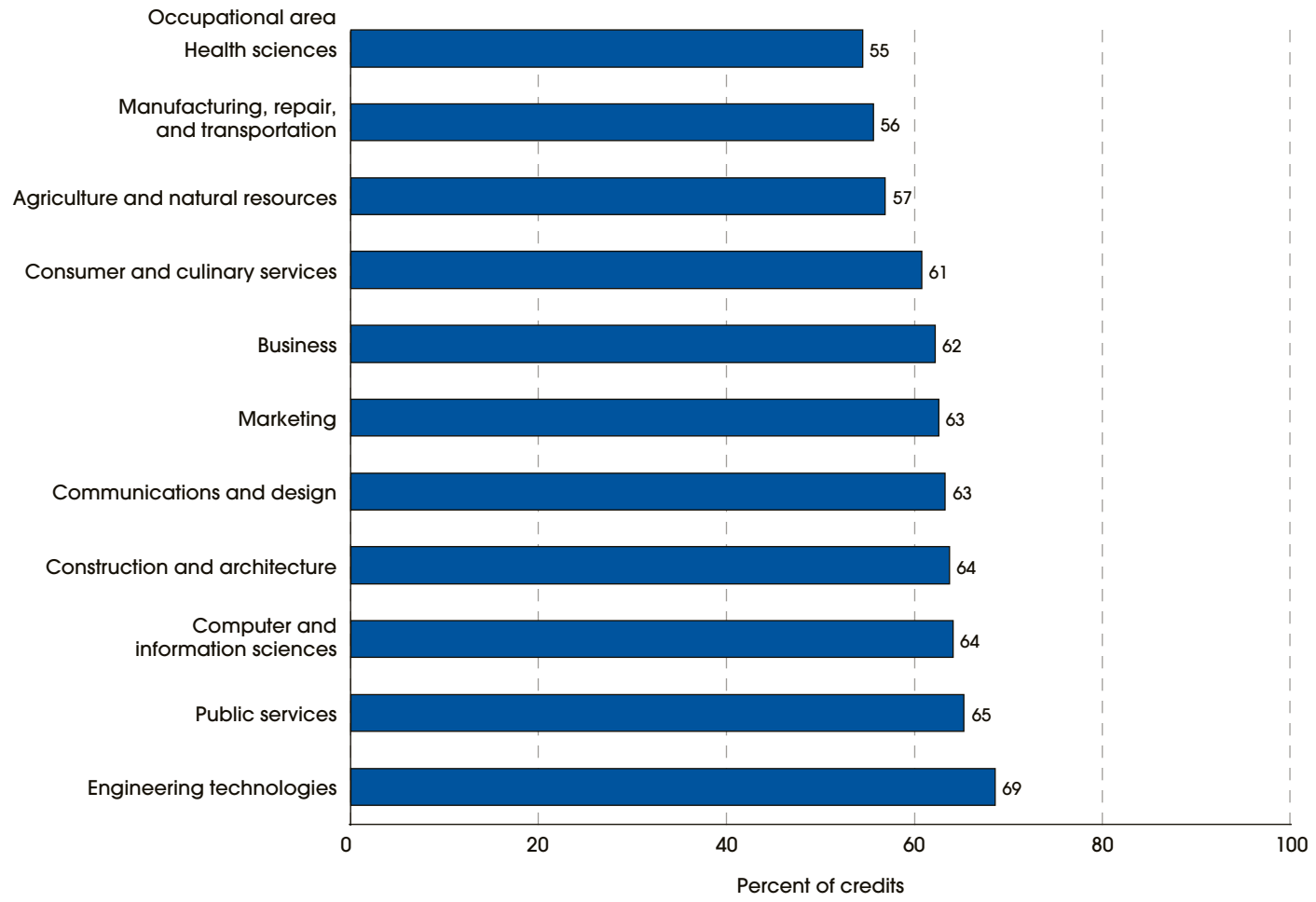
Finally, some occupational areas are more likely than others to be taken together (table 7 and exhibit 1). Specifically, graduates who earned credits in *marketing* earned more credits on

Figure 3. Average number of credits earned in an occupational area by public high school graduates who earned any credits in the area, and average number of credits these students earned in all other occupational areas: Class of 2005



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

Figure 4. Percentage of credits earned in all other occupational areas, among public high school graduates who earned any credits in an occupational area: Class of 2005



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

average in *business* than did graduates who earned credits in any other occupational area. There is also a four-way nexus among credit earners in *agriculture and natural resources; construction and architecture; engineering technologies;* and *manufacturing, repair, and transportation.* Graduates who earned credits in *construction and architecture* earned more credits in *agriculture and natural resources*[11] and in *engineering technologies* than did other occupational credit earners; credit earners in *agriculture and natural resources, construction and architecture,* and *engineering technologies* earned more credits in *manufacturing, repair, and transportation* than credit earners in other occupational areas; and credit earners in *agriculture and natural resources, engineering technologies,* and *manufacturing, repair, and transportation* earned more credits in *construction and architecture* than did other credit earners.

Summary

It is difficult to extrapolate students' intent from their coursetaking patterns. Are concentrators preparing to enter a post-high-school job in their area of concentration, preparing to enter a related postsecondary program, or simply pursuing an area of study that interests them? Are students who earn credits in more than one occupational area exploring career options, or piecing together a broad set of skills for a specific career path? These questions cannot be answered by these data, and the reader is cautioned against making such inferences. However, certain generalities about how the CTE curriculum is used by students can be deduced from these data.

First, for most high school graduates, their use of the CTE curriculum is broad rather than narrow in the sense that most (70 percent) earn credits in both occupational education and either general labor market preparation or family and consumer sciences education, and most (58 percent) earn credits in more than one occupational area. In addition, most students do not concentrate their coursetaking, even among those who earn occupational credits (55 percent of occupational credit-earners did not concentrate in an occupational area).

Second, the occupational areas in which graduates earn the highest average number of credits—*business, communications and design,* and *manufacturing, repair and transportation*—reflect different patterns of depth and breadth of participation.

[11] There was one exception: No measurable difference was found in the average number of *agriculture* credits earned by graduates who earned credits in *construction and architecture* and by graduates who earned credits in *manufacturing, repair, and transportation.*

Table 7. Average number of credits earned in each occupational area, by public high school graduates who earned any credits in each other occupational area: Class of 2005

Average number of credits earned in *agriculture and natural resources,* by graduates who earned any credits in:	
Construction and architecture	0.42 [1]
Manufacturing, repair, and transportation	0.31
Engineering technologies	0.25
Business	0.24
Computer and information sciences	0.19
Consumer and culinary services	0.19
Health sciences	0.18
Communications and design	0.17
Marketing	0.17
Public services	0.17

Average number of credits earned in *business,* by graduates who earned any credits in:	
Marketing	0.75 [2]
Agriculture and natural resources	0.53
Consumer and culinary services	0.52
Health sciences	0.51
Communications and design	0.50
Computer and information sciences	0.50
Public services	0.48
Construction and architecture	0.46
Engineering technologies	0.44
Manufacturing, repair, and transportation	0.44

Average number of credits earned in *communications and design,* by graduates who earned any credits in:	
Public services	0.40
Marketing	0.38
Computer and information sciences	0.37
Business	0.35
Consumer and culinary services	0.35
Manufacturing, repair, and transportation	0.34
Engineering technologies	0.33
Agriculture and natural resources	0.29
Health sciences	0.28
Construction and architecture	0.26

Average number of credits earned in *engineering technologies,* by graduates who earned any credits in:	
Construction and architecture	0.47 [4]
Manufacturing, repair, and transportation	0.22
Computer and information sciences	0.19
Agriculture and natural resources	0.16
Communications and design	0.14
Business	0.14
Public services	0.11
Marketing	0.11
Health sciences	0.09
Consumer and culinary services	0.08

Average number of credits earned in *computer and information sciences,* by graduates who earned any credits in:	
Engineering technologies	0.33
Construction and architecture	0.25
Communications and design	0.25
Business	0.22
Manufacturing, repair, and transportation	0.22
Public services	0.22
Agriculture and natural resources	0.21
Health sciences	0.17
Marketing	0.17
Consumer and culinary services	0.15

Average number of credits earned in *construction and architecture,* by graduates who earned any credits in:	
Engineering technologies	0.30 [3]
Agriculture and natural resources	0.24 [3]
Manufacturing, repair, and transportation	0.22 [3]
Business	0.11
Computer and information sciences	0.09
Marketing	0.09
Communications and design	0.08
Health sciences	0.07
Public services	0.07
Consumer and culinary services	0.06

Average number of credits earned in *consumer and culinary services,* by graduates who earned any credits in:	
Health sciences	0.29
Public services	0.28
Business	0.27
Communications and design	0.26
Marketing	0.26
Agriculture and natural resources	0.24
Manufacturing, repair, and transportation	0.21
Computer and information sciences	0.18
Construction and architecture	0.14
Engineering technologies	0.13

Average number of credits earned in *marketing,* by graduates who earned any credits in:	
Business	0.18
Consumer and culinary services	0.14
Health sciences	0.14
Agriculture and natural resources	0.12
Communications and design	0.12
Public services	0.12
Construction and architecture	0.11
Engineering technologies	0.11
Manufacturing, repair, and transportation	0.11
Computer and information sciences	0.10

See notes at end of table.

Table 7. Average number of credits earned in each occupational area, by public high school graduates who earned any credits in each other occupational area: Class of 2005—Continued

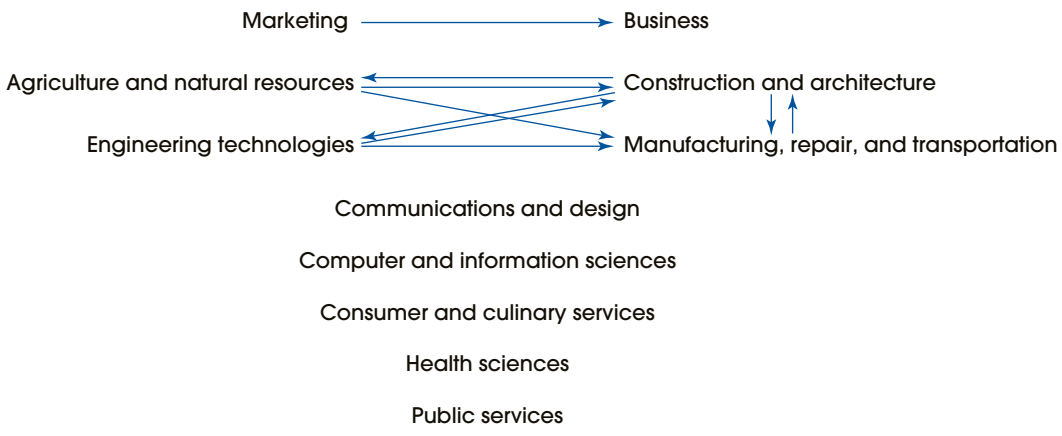
Average number of credits earned in *health sciences,* by graduates who earned any credits in:	
Consumer and culinary services	0.18
Business	0.17
Public services	0.15
Agriculture and natural resources	0.13
Marketing	0.13
Communications and design	0.11
Computer and information sciences	0.11
Engineering technologies	0.08
Manufacturing, repair, and transportation	0.08
Construction and architecture	0.06

Average number of credits earned in *manufacturing, repair, and transportation,* by graduates who earned any credits in:	
Construction and architecture	0.87 [5]
Engineering technologies	0.73 [5]
Agriculture and natural resources	0.65 [5]
Computer and information sciences	0.36
Business	0.34
Communications and design	0.33
Consumer and culinary services	0.28
Marketing	0.26
Public services	0.26
Health sciences	0.19

Average number of credits earned in *public services,* by graduates who earned any credits in:	
Health sciences	0.10
Consumer and culinary services	0.10
Business	0.08
Computer and information sciences	0.08
Agriculture and natural resources	0.07
Communications and design	0.07
Marketing	0.07
Manufacturing, repair, and transportation	0.06
Construction and architecture	0.05
Engineering technologies	0.05

[1] Graduates who earned credits in *construction and architecture* earned measurably more credits in *agriculture and natural resources* than did graduates who earned credits in any other occupational area.
[2] Graduates who earned credits in *marketing* earned measurably more credits in *business* than did graduates who earned credits in any other occupational area.
[3] Graduates who earned credits in *engineering technologies; agriculture and natural resources;* and *manufacturing, repair, and transportation* earned measurably more credits in *construction and architecture* than did graduates who earned credits in any other occupational area.
[4] Graduates who earned credits in *construction and architecture* earned measurably more credits in *engineering technologies* than did graduates who earned credits in any other occupational area.
[5] Graduates who earned credits in *construction and architecture, engineering technologies,* and *agriculture and natural resources* earned measurably more credits in *manufacturing, repair, and transportation* than did graduates who earned credits in any other occupational area.
SOURCE: U.S. Department of Education, National Center for Education Statistics, the 2005 High School Transcript Study (HSTS).

Exhibit 1. Relationships among occupational areas, based on the average number of credits earned in one occupational area by students who earned any credits in a given other occupational area: Class of 2005



NOTE: This exhibit is based on the data in table 7. An arrow from one occupational area to a second occupational area indicates that graduates who earned credits in the first occupational area earned more credits in the second occupational area than did graduates who earned credits in other occupational areas. For example, three occupational areas have an arrow pointing to *construction and architecture—agriculture and natural resources, engineering technologies,* and *manufacturing, repair, and transportation.* This means that graduates who earned credits in these three areas earned more credits in *construction and architecture* than did graduates in the remaining seven occupational areas. As seen in table 7, graduates in these three areas earned 0.22–0.30 credits in construction and architecture, compared to 0.06–0.11 for graduates who earned credits in other occupational areas.
SOURCE: U.S. Department of Education, National Center for Education Statistics, the 2005 High School Transcript Study (HSTS).

Participation in *manufacturing, repair, and transportation* is both broad (a relatively high percentage of students, 22 percent, earn credits, or participate, in this area) and deep (a relatively high number of credits are earned by students who participate in the area, an average of 1.8 credits). *Business* and *communications and design,* in contrast, have broad but not deep participation, as a relatively high proportion of graduates earn credits in these areas (40 and 30 percent, respectively), but the number of credits earned by graduates who participate in these areas is not notably high (an average of 1.3 and 1.2, respectively).

Third, looking across all the occupational areas, these indicators (figures 1–4, table 7) show that four occupational areas—*agriculture and natural resources; construction and architecture; health sciences;* and *manufacturing, repair, and transportation*—have deeper levels of coursetaking, among the students who participate in them (e.g., 32–41 percent of participants concentrate in these areas). The occupational areas taken most broadly (by 19–40 percent of graduates) are *business; communications and design; computer and information sciences; consumer and culinary services;* and *manufacturing, repair, and transportation.* Finally, some occupational areas are more likely than others to be taken together. *Marketing* coursetakers are more likely than other occupational coursetakers to earn credits in business as well, while credit-earning in four occupational areas is linked—*agriculture and natural resources; construction and architecture; engineering technologies;* and *manufacturing, repair, and transportation.*

Methodology and Technical Notes

The High School Transcript Study (HSTS) of 2005 was used in this report to examine CTE coursetaking. The HSTS periodically collects information about courses completed and credits and grades earned during high school by 12th-graders, including 12th-graders sampled for the National Assessment of Educational Progress (NAEP) tests. A brief summary of the HSTS survey methodology is provided below; further information is available in Shettle et al. (2008).

In coding the HSTS data, consistent methods for classifying courses were applied. High school courses vary by content and level, even those with similar course titles. Therefore, to compare the thousands of transcripts collected from schools included in the HSTS, and to ensure that each course is uniquely identified, a common course coding system, the Classification of Secondary School Courses (CSSC), was used. The 1998 revision of the Secondary School Taxonomy (SST) (Bradby and Hoachlander 1999), combined with the 2007 revision to the CTE section of the SST (Bradby and Hudson 2007), was then used to assign each of the over 2,000 CSSC course codes to subject areas.

The 2007 SST Revision

The SST classifies courses as academic, career/technical education, or enrichment.[12] CTE courses are classified into the three curriculum areas of family and consumer sciences education (FSCE), general labor market preparation (GLMP), and occupational education. This section provides a brief overview of the revisions made to the SST and to how participation differs using the two taxonomies; the reader is referred to Bradby and Hudson (2007) for more specific information on the 2007 revision.

Family and Consumer Sciences Education and General Labor Market Preparation. Some courses were moved out of FCSE into the occupational areas of *manufacturing, repair, and transportation* and *consumer and culinary services,* while a few other courses were moved into FCSE from p*ersonal and other services, construction,* and *mechanics and repair.* For GLMP, one course was moved out of this category to *business* and one to *manufacturing, repair, and transportation,* while other courses were moved into this category from *other precision production, business services,* and *computer technology.*

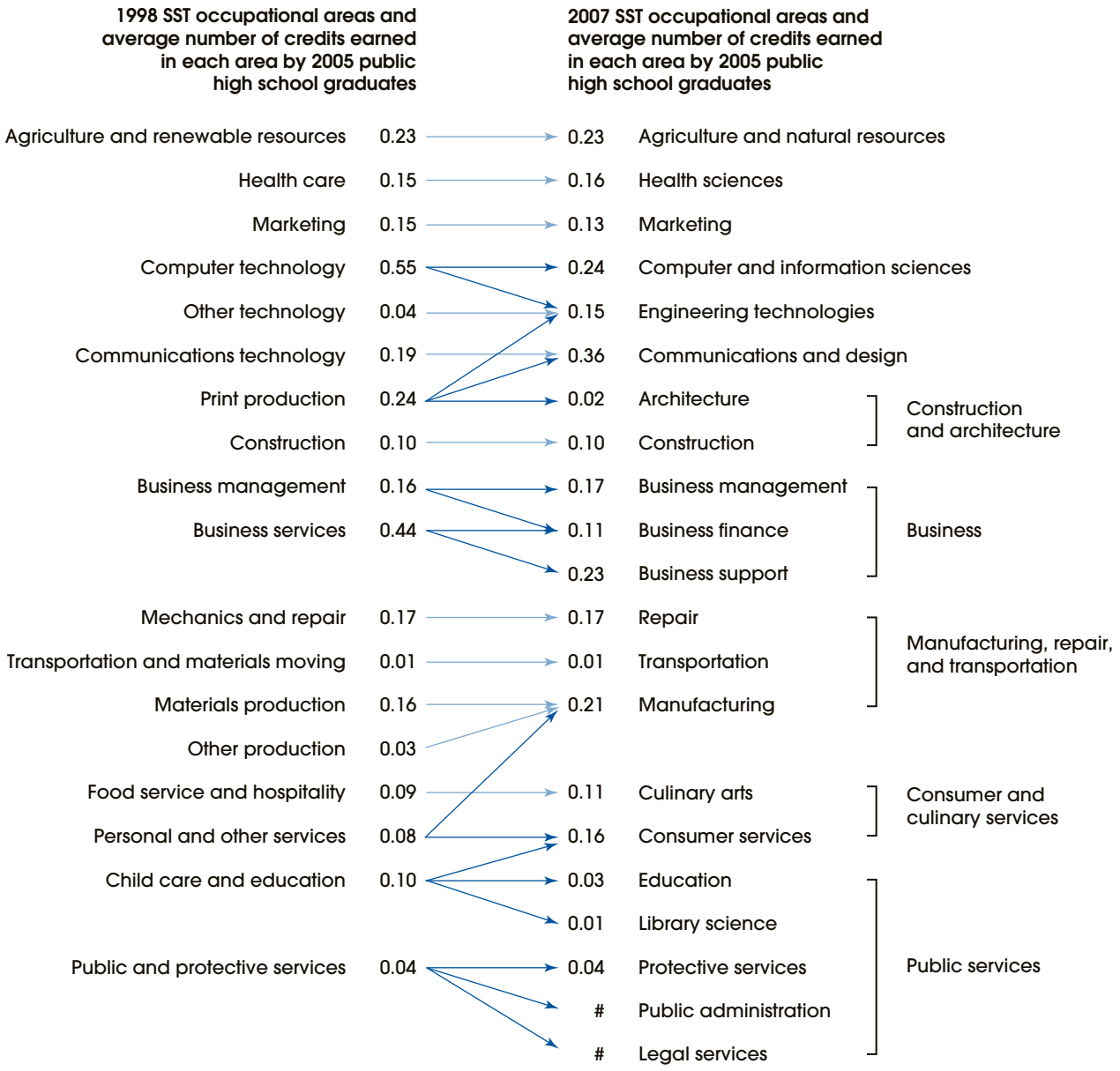
Occupational Education. The 2007 revision largely focused on the reorganization of occupational education. Exhibit 2 indicates the major shifts made between the occupational education categories from the 1998 SST to the 2007 SST. One result of this reorganization is increased specificity for many occupational areas (e.g., elimination of miscellaneous *other production* and *other technology;* disaggregation of *business management* and *print production*). For some occupational areas, changes were slight (e.g., *agriculture and renewable resources, construction, health care, marketing, mechanics and repair, transportation and materials moving*), including movement of a few courses into or out of the area and new nomenclature for some areas (such as *health care* becoming *health sciences*). Other occupational areas underwent more extensive change. For example, *print production* courses were divided into the three occupational areas of *architecture, communications and design,* and *engineering technologies.*

The 21 occupational areas in the revised 2007 SST were aggregated for analysis in this brief into 11 areas, as shown in exhibit 2. The aggregations were made to produce sufficient sample size for analysis and to provide more distinct occupational areas (e.g., by combining *business finance, business management,* and *business support* into *business*). The aggregations used here are consistent with the previous version of the SST, with one exception. To be consistent with states' career cluster framework, this analysis combines *architecture* with *construction,* rather than with either of the categories with which it had been combined in the previous SST (*engineering technologies* and *communications and design,* previously combined in *print production*).

Participation Using the 1998 Versus 2007 Taxonomy. Because the 2007 taxonomy did not change the overall set of courses that comprise CTE, the overall percentage of students who earned CTE credits (97 percent) and the average number of CTE credits earned (4.0) was the same using both taxonomies (table 8). The main change resulting from the newly revised taxonomy was an increase in general labor market preparation coursetaking and a decrease in occupational coursetaking. Although the percentage of 2005 high school graduates earning credits in occupational education was lower using the 2007 SST compared to the 1998 SST (87 versus

[12] Academic courses encompass English, mathematics, science, social studies, fine arts, and foreign languages. Enrichment includes health, physical, and recreational education; religion and theology; and military science.

Exhibit 2. Comparison of the 1998 and 2007 Secondary School Taxonomy (SST) occupational areas within the career/technical education (CTE) occupational curriculum: Class of 2005



Rounds to zero.
NOTE: Occupational areas from the 1998 SST are lined up with their corresponding 2007 SST areas. Dark arrows indicate where a 1998 occupational area was split into different 2007 areas. For example, computer technology was split between *computer and information sciences* and *engineering technologies*. This exhibit provides a schematic of the main correspondence between the old and new taxonomies; small changes are not indicated here. Further details are available in *The 2007 Revision of the Career/Technical Education Portion of the Secondary School Taxonomy* (NCES 2008-030).
SOURCE: U.S. Department of Education, National Center for Education Statistics, the 2005 High School Transcript Study (HSTS).

92 percent), the percentage of students who concentrated in an occupational area using the new definition was greater than the percentage using the old definition (39 versus 21 percent). This increase arises from the switch to the 2-credit cut-off rather than from the switch to a different and broader set of 11 occupational areas. Using the same concentrator definition, there is no measurable difference in concentration rates using the 1998 taxonomy (with 18 categories) versus the 2007 taxonomy (with 11 categories): 39 percent of graduates concentrated under the 2-credit definition, and 21 percent concentrated under the 3-credit definition. In theory, broadening the occupational areas (from 18 to 11) should have increased concentration rates; the lack of increase in concentration rates observed here apparently results from the shifts in courses from the 1998 to the 2007 taxonomy.[13]

Target Population, Sampling, and Weighting

The target population for the 2005 HSTS was all students in public and private schools in the United States who were enrolled in 12th grade in 2004–05 and who completed school

[13] A separate analysis using the new taxonomy showed the expected increase in concentration rates when using 16 versus 11 occupational areas, with an increase from 36 to 39 percent using the 2-credit definition, and from 19 to 21 percent using the 3-credit definition.

Table 8. Comparison of participation measures among public high school graduates, using the 1998 Secondary School Taxonomy versus the 2007 Secondary School Taxonomy: Class of 2005

Curriculum area	Percent of class of 2005 graduates earning credits/concentrating		Average number of credits earned by class of 2005	
	1998 taxonomy	2007 taxonomy	1998 taxonomy	2007 taxonomy
All curriculum areas	100.0	100.0	26.67	26.67
Academic	100.0	100.0	19.44	19.44
Enrichment/other	99.8	99.8	3.23	3.23
Career/technical education (CTE), total	96.6	96.6	4.01	4.01
Family and consumer sciences education (FCSE)	45.3	41.1	0.51	0.40
General labor market preparation (GLMP)	39.9	69.1	0.46	0.97
Occupational education	92.0	86.9	3.03	2.63
2-credit definition of concentration	—	38.8	†	†
3-credit definition of concentration	20.8	21.3	†	†

— Not available.
† Not applicable.
NOTE: Completing an occupational concentration is defined as earning at least 2.0 credits within an occupational area (2-credit definition) or at least 3.0 credits within an occupational area (3-credit definition). In the 1998 taxonomy, concentrating was defined based on the 18 occupational areas listed in the left-hand side of exhibit 2. In the 2007 taxonomy, concentrating was defined based on the 11 aggregated occupational areas listed in the right-hand side of exhibit 2.
SOURCE: U.S. Department of Education, National Center for Education Statistics, the 2005 High School Transcript Study (HSTS).

in 2005. Sampling procedures were designed to provide a nationally representative sample of this target population. For public schools, the HSTS sample was the 12th-grade public school sample for the 2005 NAEP mathematics and science assessment; that is, the HSTS sample included every eligible sampled NAEP 2005 12th-grade public school that was contacted for the HSTS, whether or not the school participated in the NAEP assessments. For private schools, the HSTS sample was a subsample from the NAEP 2005 12th-grade private school sample (for which private schools had been oversampled).

Within schools, only those 12th-graders who had completed high school by early fall of the study year had their transcript data included in the HSTS. Students excluded from the study included NAEP-ineligibles,[14] noncompleters, and students having incomplete transcripts. For each student, transcript information was collected for the 9th through the 12th grade. Transcripts were collected from about 640 public schools and 80 private schools, yielding a nationally representative sample of over 26,000 transcripts from more than 29,000 students, representing approximately 2.7 million 2005 high school completers.

All estimates were weighted using sample weights to provide unbiased estimates of the national population. The HSTS includes two weights, NAEP-linked weights and HSTS sample weights; the HSTS weights were used in this analysis.

Response Rates

To ensure unbiased samples, NCES has established participation rate standards for national studies that must be met in order for the results to be reported without a nonresponse bias analysis. For the HSTS, participation rates for the original sample needed to be at least 85 percent for both schools and graduates. Although the HSTS weighted graduate within-school response rate was 99.7 percent, the school response rate (84.2 percent) fell slightly below this NCES standard.

A nonresponse bias analysis was conducted to determine whether the school characteristics from nonresponding schools showed significant differences from those of the responding schools. Among public schools, the characteristics analyzed included region, school location, grade enrollment, minority school (high/low), and percent minority for different race groups. Significant differences were found by region, school location, and percent minority. Nonresponse weighting adjustments were used to correct for these differences. However, it is unlikely that these adjustments completely account for the differences. For details of these analyses, see Shettle et al. (2008).

Analytic Sample

For this report, the HSTS sample was restricted to public high school graduates who earned regular or honors diplomas, earned 16 or more total credits in high school, and earned more than zero credits in English. See Alt and Bradby (1999) for the rationale behind this approach. After applying the stated selection criteria, the HSTS analysis sample included about 24,000 public high school graduates of the class of 2005.

The restriction to public school graduates makes this report consistent with past NCES reports that examine CTE coursetaking (Levesque 2003, Levesque et al. 2008, Levesque et al. 2000). The exclusion of high school dropouts most likely skews CTE coursetaking estimates (as well as other coursetaking estimates) upward, as dropouts typically leave school before completing a full complement of courses (Hampden-Thompson, Warkentien, and Daniel 2009). For example, dropouts may be less likely than graduates to be concentrators, but this lower probability of being a concentrator may not reflect a curricular choice; it is not known what courses dropouts would have taken if they

[14] NAEP ineligibles were English language learners and students with disabilities who could not meaningfully participate in the assessment, as determined by school staff.

had remained in school. If one is interested in coursetaking within the context of a complete high school curriculum, the graduate sample is the most relevant sample.[15]

Statistical Procedures

The comparisons of means and proportions discussed in this report were tested using Student's *t* statistic. Differences between estimates were tested against the probability of a Type I error,[16] or significance level. The statistical significance of each comparison was determined by calculating the Student's *t* values for the differences between each pair of means or proportions and comparing these with published tables of significance levels for two-tailed hypothesis testing.

Student's *t* values were computed to test the difference between independent estimates with the following formula:

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

where E_1 and E_2 are the estimates to be compared and se_1 and se_2 are their corresponding standard errors.

Patterns of participation across the 11 occupational areas were compared using the Spearman rank-order correlation. For both the Student's *t* statistic and the Spearman correlation coefficient, the significance level was set at .05, using a two-tailed test.

There are hazards in reporting statistical tests for each comparison. First, comparisons based on large *t* statistics may appear to merit special attention. This can be misleading since the magnitude of the *t* statistic is related not only to the observed differences in means or percentages but also to the number of respondents in the specific categories used for comparison. Hence, a small difference compared across a large number of respondents would produce a large (and thus possibly statistically significant) *t* statistic.

A second hazard in reporting statistical tests is the possibility that one can report a "false positive" or Type I error. In the case of a *t* statistic, this false positive would result when a difference measured with a particular sample showed a statistically significant difference when there is no difference in the underlying population. Statistical tests are designed to control this type of error, denoted by alpha. The alpha level of .05 selected for findings in this report indicates that a difference of a certain magnitude or larger would be produced no more than one time out of 20 when there was no actual difference between the quantities in the underlying population. When analysts test hypotheses that show *t* values at the .05 level or smaller, they treat this finding as rejecting the null hypothesis that there is no difference between the two quantities. Failing to detect a difference, however, does not necessarily imply the values are the same or equivalent.

There are cases in which exercising additional caution concerning alpha levels is warranted. When a large number of related comparisons (a family of comparisons) is tested, the probability of a Type I error increases as the number of comparisons within the family increases. For example, when making paired comparisons among 11 aggregated occupational areas, a family of 55 possible comparisons could be made. To correct for this inflated Type I error probability when making comparisons among occupational groups in this report, the Benjamini-Hochberg procedure was used. This procedure controls the false discovery rate (defined as the probability that the population difference is mistakenly assumed to be in a different direction from the sample difference) such that it remains less than alpha divided by 2 (Thissen, Steinberg, and Kuang 2002). Following Thissen et al. (2002), the degrees of freedom for the Benjamini-Hochberg procedure were 62, based on the number of Jackknife replicate weights used to calculate standard errors in the 2005 HSTS.

[15] In addition, the HSTS does not provide an accurate dropout sample. The NAEP sample from which the HSTS sample is drawn requires that students be enrolled in grade 12 in the assessment year. Because the majority of students who drop out of high school do so before grade 12 (Stillwell and Hoffman 2008), the HSTS sample underestimates the dropout population.

[16] A Type I error occurs when one concludes that a difference observed in a sample reflects a true difference in the population from which the sample was drawn, when no such difference is present.

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Appendix A. Standard Error Tables

Table A–1. Standard errors for Table 1: Percentage of public high school graduates earning credits in a curriculum area, percentage concentrating in career/technical education, and average number of credits earned in an area: Class of 2005

Curriculum area	Percent of graduates earning credits/ concentrating	Average number of credits earned
All curriculum areas	†	0.100
Academic	†	0.071
Enrichment/other	0.05	0.040
Career/technical education (CTE), total	0.28	0.059
Family and consumer sciences education (FCSE)	1.10	0.013
General labor market preparation (GLMP)	1.09	0.026
Occupational education	0.46	0.044
2-credit definition of concentration	0.71	†
3-credit definition of concentration	0.60	†

† Not applicable.
SOURCE: U.S. Department of Education, National Center for Education Statistics, the 2005 High School Transcript Study (HSTS).

Table A-2. Standard errors for Table 2: Percentage of public high school graduates who earned various combinations of career/technical education (CTE) credits: Class of 2005

Course combination	Percent
Total, any combination of CTE credits	**†**
No CTE credits	0.28
Family and consumer sciences education (FCSE) credits only	0.15
General labor market preparation (GLMP) credits only	0.28
Occupational education credits only	0.78
FCSE and GLMP credits only	0.24
Occupational credits in combination with any other CTE credits	0.76
Occupational and FCSE credits only	0.55
Occupational and GLMP credits only	0.89
Credits in all three CTE areas	0.87

† Not applicable.
SOURCE: U.S. Department of Education, National Center for Education Statistics, the 2005 High School Transcript Study (HSTS).

Table A-3. Standard errors for Table 3: Percentage distribution of public high school graduates, graduates who earned any occupational credits, and occupational concentrators, by number of occupational areas in which graduates earned credits: Class of 2005

Number of occupational areas in which graduates earned credits	All graduates	Graduates earning any occupational credits	Occupational concentrators
Total, any number of occupational areas	**†**	**†**	**†**
0 occupational areas	0.46	†	†
1 occupational area	0.53	0.65	0.72
More than one occupational area	0.73	0.65	0.72
2 occupational areas	0.39	0.43	0.70
3 occupational areas	0.37	0.39	0.59
4 occupational areas	0.30	0.32	0.51
5 or more occupational areas	0.26	0.30	0.44

† Not applicable.
SOURCE: U.S. Department of Education, National Center for Education Statistics, the 2005 High School Transcript Study (HSTS).

Table A-4. Standard errors for Table 4: Average number of credits earned by public high school graduates during high school, by occupational area: Class of 2005

Occupational area	Average credits
Agriculture and natural resources	0.013
Business	0.016
Communications and design	0.012
Computer and information sciences	0.011
Construction and architecture	0.007
Consumer and culinary services	0.010
Engineering technologies	0.008
Health sciences	0.010
Manufacturing, repair, and transportation	0.016
Marketing	0.009
Public services	0.009

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

Table A-5. Standard errors for Table 5: Percentage of public high school graduates who concentrated in each occupational area, overall and among graduates who earned various numbers of occupational credits: Class of 2005

	Percent of each group who were occupational concentrators		
Occupational area of concentration	All graduates	Graduates who earned any occupational credits	Graduates who earned 2.0 or more occupational credits
Any occupational area	0.7	0.8	0.8
Agriculture and natural resources	0.3	0.3	0.5
Business	0.4	0.5	0.7
Communications and design	0.3	0.3	0.5
Computer and information sciences	0.2	0.3	0.4
Construction and architecture	0.2	0.2	0.3
Consumer and culinary services	0.3	0.3	0.4
Engineering technologies	0.2	0.2	0.4
Health sciences	0.2	0.3	0.4
Manufacturing, repair, and transportation	0.4	0.4	0.6
Marketing	0.2	0.3	0.4
Public services	0.2	0.2	0.3

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

Table A-6. Standard errors for Table 6: Percentage of public high school graduates concentrating in each occupational area who earned credits in other occupational areas: Class of 2005

Occupational area of concentration	Percent earning credits in other occupational areas
Agriculture and natural resources	0.98
Business	0.80
Communications and design	0.83
Computer and information sciences	1.07
Construction and architecture	0.88
Consumer and culinary services	0.78
Engineering technologies	0.73
Health sciences	0.84
Manufacturing, repair, and transportation	1.02
Marketing	0.80
Public services	1.20

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

Table A-7. Standard errors for Table 7: Average number of credits earned in each occupational area, by public high school graduates who earned any credits in each other occupational area: Class of 2005

Average number of credits earned in *agriculture and natural resources,* by graduates who earned any credits in:	
Construction and architecture	0.039
Manufacturing, repair, and transportation	0.027
Engineering technologies	0.030
Business	0.020
Computer and information sciences	0.027
Consumer and culinary services	0.019
Health sciences	0.023
Communications and design	0.016
Marketing	0.024
Public services	0.027

Average number of credits earned in *business,* by graduates who earned any credits in:	
Marketing	0.040
Agriculture and natural resources	0.035
Consumer and culinary services	0.025
Health sciences	0.027
Communications and design	0.023
Computer and information sciences	0.024
Public services	0.034
Construction and architecture	0.031
Engineering technologies	0.027
Manufacturing, repair, and transportation	0.021

Average number of credits earned in *communications and design,* by graduates who earned any credits in:	
Public services	0.033
Marketing	0.029
Computer and information sciences	0.021
Business	0.013
Consumer and culinary services	0.017
Manufacturing, repair, and transportation	0.019
Engineering technologies	0.025
Agriculture and natural resources	0.022
Health sciences	0.025
Construction and architecture	0.022

Average number of credits earned in *engineering technologies,* by graduates who earned any credits in:	
Construction and architecture	0.041
Manufacturing, repair, and transportation	0.014
Computer and information sciences	0.016
Agriculture and natural resources	0.019
Communications and design	0.010
Business	0.011
Public services	0.015
Marketing	0.011
Health sciences	0.017
Consumer and culinary services	0.007

Average number of credits earned in *computer and information sciences,* by graduates who earned any credits in:	
Engineering technologies	0.025
Construction and architecture	0.026
Communications and design	0.015
Business	0.011
Manufacturing, repair, and transportation	0.015
Public services	0.038
Agriculture and natural resources	0.022
Health sciences	0.018
Marketing	0.013
Consumer and culinary services	0.014

Average number of credits earned in *construction and architecture,* by graduates who earned any credits in:	
Engineering technologies	0.027
Agriculture and natural resources	0.031
Manufacturing, repair, and transportation	0.019
Business	0.010
Computer and information sciences	0.010
Marketing	0.015
Communications and design	0.009
Health sciences	0.018
Public services	0.016
Consumer and culinary services	0.009

Average number of credits earned in *consumer and culinary services,* by graduates who earned any credits in:	
Health sciences	0.026
Public services	0.032
Business	0.013
Communications and design	0.016
Marketing	0.023
Agriculture and natural resources	0.021
Manufacturing, repair, and transportation	0.016
Computer and information sciences	0.012
Construction and architecture	0.018
Engineering technologies	0.011

Average number of credits earned in *marketing,* by graduates who earned any credits in:	
Business	0.014
Consumer and culinary services	0.011
Health sciences	0.019
Agriculture and natural resources	0.017
Communications and design	0.012
Public services	0.017
Construction and architecture	0.018
Engineering technologies	0.016
Manufacturing, repair, and transportation	0.011
Computer and information sciences	0.011

See notes at end of table.

Table A-7. Standard errors for Table 7: Average number of credits earned in each occupational area, by public high school graduates who earned any credits in each other occupational area: Class of 2005—Continued

Average number of credits earned in *health sciences,* by graduates who earned any credits in:	
Consumer and culinary services	0.016
Business	0.014
Public services	0.023
Agriculture and natural resources	0.020
Marketing	0.015
Communications and design	0.011
Computer and information sciences	0.012
Engineering technologies	0.013
Manufacturing, repair, and transportation	0.007
Construction and architecture	0.009

Average number of credits earned in *manufacturing, repair, and transportation,* by graduates who earned any credits in:	
Construction and architecture	0.064
Engineering technologies	0.049
Agriculture and natural resources	0.048
Computer and information sciences	0.032
Business	0.019
Communications and design	0.017
Consumer and culinary services	0.020
Marketing	0.023
Public services	0.035
Health sciences	0.017

Average number of credits earned in *public services,* by graduates who earned any credits in:	
Health sciences	0.015
Consumer and culinary services	0.020
Business	0.011
Computer and information sciences	0.017
Agriculture and natural resources	0.011
Communications and design	0.007
Marketing	0.010
Manufacturing, repair, and transportation	0.007
Construction and architecture	0.011
Engineering technologies	0.009

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

Table A-8. Standard errors for Table 8: Comparison of participation measures among public high school graduates, using the 1998 Secondary School Taxonomy versus the 2007 Secondary School Taxonomy: Class of 2005

	Percent of class of 2005 graduates earning credits/concentrating		Average number of credits earned by class of 2005	
Curriculum area	1998 taxonomy	2007 taxonomy	1998 taxonomy	2007 taxonomy
All curriculum areas	†	†	0.100	0.100
Academic	†	†	0.071	0.071
Enrichment/other	0.05	0.05	0.040	0.040
Career/technical education (CTE), total	0.27	0.28	0.059	0.059
Family and consumer sciences education (FCSE)	1.05	1.10	0.015	0.013
General labor market preparation (GLMP)	1.60	1.09	0.021	0.026
Occupational education	0.37	0.46	0.047	0.044
2-credit definition of concentration	†	0.71	†	†
3-credit definition of concentration	0.61	0.60	†	†

† Not applicable.
SOURCE: U.S. Department of Education, National Center for Education Statistics, the 2005 High School Transcript Study (HSTS).

Table A-9. Data for figure 1: Percentage of public high school graduates who earned credits in each occupational area and, among those graduates, the average number of credits earned in the area: Class of 2005

	Percent of graduates earning credits		Average number of credits, among credit earners	
Occupational area	Percent	Standard error	Percent	Standard error
Agriculture and natural resources	11.5	0.54	2.00	0.070
Manufacturing, repair, and transportation	22.1	0.85	1.76	0.055
Construction and architecture	6.7	0.33	1.75	0.089
Health sciences	9.3	0.66	1.69	0.083
Marketing	9.4	0.54	1.41	0.049
Consumer and culinary services	20.0	0.77	1.33	0.042
Business	39.8	1.08	1.28	0.023
Engineering technologies	11.8	0.53	1.28	0.045
Computer and information sciences	19.4	0.91	1.22	0.029
Communications and design	30.2	0.79	1.19	0.026
Public services	6.9	0.61	1.19	0.100

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

Table A-10. Data for figure 2: Percentage of public high school graduates who earned credits in each occupational area and, among those graduates, the percentage who concentrated in the area: Class of 2005

	Percent of graduates earning credits		Percent of credit earners who concentrate	
Occupational area	Percent	Standard error	Percent	Standard error
Agriculture and natural resources	11.5	0.54	41.1	1.70
Health sciences	9.3	0.66	34.4	2.35
Manufacturing, repair, and transportation	22.1	0.85	34.0	1.30
Construction and architecture	6.7	0.33	31.9	1.91
Marketing	9.4	0.54	28.0	1.65
Consumer and culinary services	20.0	0.77	21.8	1.16
Business	39.8	1.08	21.3	0.92
Engineering technologies	11.8	0.53	20.7	1.53
Computer and information sciences	19.4	0.91	19.1	1.04
Communications and design	30.2	0.79	17.9	0.88
Public services	6.9	0.61	17.1	2.40

NOTE: Completing an occupational concentration is defined as earning at least 2.0 credits in one of the 11 occupational areas listed in the table.
SOURCE: U.S. Department of Education, National Center for Education Statistics, the 2005 High School Transcript Study (HSTS).

Table A-11. Data for figure 3: Average number of credits earned in an occupational area by public high school graduates who earned any credits in the area, and average number of credits these students earned in all other occupational areas: Class of 2005

	Credits earned in given occupational area		Credits earned in all other occupational areas	
Occupational area	Average number	Standard error	Average number	Standard error
Agriculture and natural resources	2.00	0.070	2.64	0.109
Communications and design	1.19	0.026	2.04	0.053
Business	1.28	0.023	2.10	0.053
Computer and information sciences	1.22	0.029	2.17	0.069
Consumer and culinary services	1.33	0.042	2.06	0.048
Public services	1.19	0.100	2.24	0.082
Health sciences	1.69	0.083	2.02	0.060
Marketing	1.41	0.049	2.37	0.073
Manufacturing, repair, and transportation	1.76	0.055	2.21	0.058
Engineering technologies	1.28	0.045	2.79	0.091
Construction and architecture	1.75	0.089	3.08	0.106

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

Table A-12. Data for figure 4: Percentage of credits earned in all other occupational areas, among public high school graduates who earned any credits in an occupational area: Class of 2005

Occupational area	Percent	Standard error
Engineering technologies	68.6	1.10
Public services	65.3	2.31
Computer and information sciences	64.1	0.79
Communications and design	63.3	0.91
Marketing	62.6	1.03
Construction and architecture	63.7	1.51
Business	62.2	0.62
Consumer and culinary services	60.8	1.00
Health sciences	54.5	1.61
Manufacturing, repair, and transportation	55.6	0.99
Agriculture and natural resources	56.9	1.48

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

For more information on the National Assessment of Educational Progress High School Transcript Studies (HSTS), visit http://nces.ed.gov/nationsreportcard/hsts. For more information on the CTE Statistics program, visit http://nces.ed.gov/surveys/ctes. To order additional copies of this Statistics in Brief or other NCES publications, call 1-877-4ED-PUBS or visit http://www.edpubs.org. NCES publications are also available on the Internet at http://nces.ed.gov.

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